PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Vol. 108, No. 25 Thursday, June 22, 1939 Price Ten Cents

Superintendents Meet at Washington, D. C.

H. H. Harrison of the Crystal Tissue Co. Chosen President At Largely Attended Convention—Meeting Next Year Will Be Held In Cincinnati—Reports Show Association In Excellent Shape — Those In Attendance.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 19, 1939—The Twentieth Annual Convention of the American Pulp and Paper Mill Superintendents Association was held at the Wardman Park Hotel, Washington, D. C., June 13-14-15, 1939. Although the Convention was not scheduled to start until Tuesday, the thirteenth, a great many of the guests must have felt a little superstition about the day as a great influx of arrivals were checked in on Sunday and Monday and members who thought they were on time had considerable difficulty in obtaining accommodations. However, it was estimated that well over 800 members and guests attended which is a sizeable number to accommodate in this crowded Capital of ours.

Exhibitors' Dinner

The Exhibitors' Dinner which was held on Monday night was well attended. Mr. Roy Zellers, president of the Superintendents Association said:

"The Association and the allied industries have many interests in common. This morning at the meeting of the Board of Trustees of the American Pulp and Paper Mill Superintendents' Association, as President, I had the pleasure of making my report, stating:

"'I have come to the conclusion that just as long as we, as an Association, make a real effort to have these meetings worthwhile to our members, executives, and exhibitors, our equipment exposition will continue to be one of the important and successful features of these meetings.

"'We are indeed fortunate in having a very progressive, sincere, and hustling Exhibitors Committee. They are just as anxious to assist in making these annual meetings profitable and worthwhile as we are. The results of the past few years prove beyond doubt that we and they are reaping success.'

"The thought that I had in mind in quoting these paragraphs relative to the Exposition was that we should get just as many men connected with the paper industry as possible to attend these meetings to do so, because I feel that if the Association and the exhibitors work together to sell the executives of the industry the idea that the superintendents' conventions are really worthwhile it can't help but pay dividends for the exhibitors as well as the Association."

H. H. HARRISON
President

J. W. Hemphill Jr., chairman of the Exhibitors' Committee, outlined the highlights of the work of the exhibitors' Committee during the last two years and also the plan for the permanent organization of the Exhibitors' Committee. This plan of organization was discussed at the business meeting of the exhibitors' committee which immediately followed the dinner.

George Craigie, convention manager, said that he had found the

Exhibitors' Committee extremely helpful in arranging the Washington program.

John Cornell, secretary of the Exhibitors' Committee, outlined the work of the Committee during the year and explained the plan for the joint reception of the Exhibitors' Committee and the Superintendents' Association held Thursday afternoon. Mr. Cornell also reported that the finances of the Exhibitors' Committee were in sound shape.

Noon Luncheon

Francis D. Bowman, publicity director of the Carborundum Company, acting as chairman of the Entertainment Committee again excelled himself and "hit a new high" in the realm of entertainment. At the luncheon, the guests were permitted a peek at what was to come by his presentation of James Shield and Miss Hollis Shaw, who so won the hearts of everyone with their charm, personality and singing that they were adopted by the members and guests during the entire convention. Their appearances were greatly applauded on every occasion.

H. R. Harrigan Acts as Toastmaster

At the luncheon President Zellers presented H. R. Harrigan, general manager of the District of Columbia Paper Mills Company as toastmaster. Mr. Harrigan, who had heard many welcomes and who is a native of Washington extended what he termed a "homey" welcome. Mr. Harrigan then introduced Hugh Clegg, assistant director, Federal Bureau of Investigation in Washington, D. C., who gave a very interesting and intimate talk on the operations of the Federal Bureau of Investigation in Washington and invited the guests to visit the Department of Justice Building and actually see how the various departments operated. He also gave some very graphic accounts based on actual experiences of the F. B. I. agents which, of course, are now considered closed by their Bureau.

Following Mr. Clegg was a talk by A. E. Giegengack, public printer of the United States and the "biggest buyer" of paper in the world. Mr. Giegengack in a very interesting and humorous strain spoke on the many details of the paper in the Government Printing Office and informed the delegates that all "rejects" bearing his name were not personally rejected by him but by some chemist in the department where paper was inspected. In beginning his talk, he said he would rather follow Mr. Clegg of the F. B. I. than have any members of the F. B. I. follow him.

General Conference

In the afternoon there was a general conference in the Little Theatre where papers were presented and discussed as follows: "The Handling of Paper" by George Ortler, Deputy Public Printer, Government Printing Office. "Paper Defects" by L. K. Johnson, Asst. Foreman, Main Pressroom, Government Printing Office. "The Effect of Humidity on Paper and Printing" by Wm. H. Dahl, Foreman, Postal Card & M. O. Section, Government Printing Office.

In the evening it was expected by all present that an enjoyable boat trip on the Potomac would add to their comfort, pleasure, and enjoyment but inclement weather, as expressed in the program but which hardly describes the torrent of rain which descended on Washington about that time, prevented this part of the program from being carried out and the secretary of the boat committee, E. J. Thom, quickly and tactfully conferred with other members of the convention committee and the festivities were continued at the hotel in form of entertainment and dancing.

Tuesday morning was in most part given over to the registration and a sort of "get together". At about eleven o'clock the gavel sounded and the first meeting of the Convention was opened by President F. L. Zellers, who, after a short address, introduced the Reverend James Shera Montgomery, Chaplain, United States House of Representatives.

In Memoriam

R. L. Eminger, National Secretary, read the names of those who had passed away during the past year

PICTURE TAKEN AT THE BANQUET HELD AT THE TWENTIETH ANNUAL CONVENTION OF THE AMERICAN PULP AND PAPER

while the audience stood in silence. Dr. Montgomery asked Divine comfort and consolation for the bereaved families.

The Honorable Elwood Seal, corporation counsel for the District of Columbia was introduced by President Zellers. Speaking in behalf of the District Commissioners he welcomed the members of the Association most heartily.

First Vice President H. H. Harrison responded to Mr. Seal's address of welcome. President Zellers then delivered his annual address.

Group Meetings

All the group meetings were held on Wednesday and the papers presented appear below.

BOARD

Chairman—E. C. Gildenzopf, Schmidt & Ault Paper Company, York, Pa.

"Waste Paper Stock Material Prepared by the Double Selective Screening System"—Arno W. Nickerson, Consulting Engr., New York City.

"Modern Electric Drives on Board Machinery"—F. M. Roberts, General Electric Company, Schenectady, N. Y.

"Utilization of Waste Material in Board Mills"—E. C. Gildenzopf, Schmidt & Ault Paper Company, York, Pa.

Round table discussion led by Oscar Stamets, Riegel Paper Corporation, Riegelsville, N. J.

CHEMICAL PULP

Chairman—H. E. Karberg, Alliance Paper Mills, Merritton, Ont.

"Control Instruments in a Modern Pulp Mill"—C. D. DeMers, Taylor Instrument Companies, Rochester, N. Y.

"A Review of European and American Bleaching Practices"—T. W. Toovey, Pennsylvania Salt Manufacturing Company, Philadelphia, Penna.

"Some Applications of Corrosion Resisting Metals in the Pulp and Paper Industry"—F. L. LaQue, International Nickel Company, New York City.

COATED PAPERS

Chairman—O. W. Callighan, Edgar Brothers Company, 50 Church St., New York City.

"Paper Machine Filming Processes" — Peter J. Massey, Combined Locks Paper Company, Appleton, Wis.

FINE PAPERS

Chairman—James J. Rogers II, J. & J. Rogers Company, Ausable Forks, N. Y.

"Rubber Covered Rolls for Paper Machines"—W. E. Brown, Manager, Chemical Roll Division, American Wringer Company, Woonsocket, R. I.

"The Dryer Felt"—Charles K. Dillingham, William L. Barrell Company, Boston, Mass.

"Starches and Sizing"—Mr. Smith, Stein Hall & Company, Inc., New York, N. Y.

FINISHING, STORING, SHIPPING

Chairman—Wallace Shymanski, Marathon Paper Mills Company, Rothschild, Wis.

"Costs and Standards in Finishing Room Operation" —Wm. Riegers, Beckett Paper Company, Hamilton, Ohio.

"Shipping Paper Safely to Customer"—W. L. Ennis, Manager, Claim Prevention Dept., The Milwaukee Road, Chicago, Ill.

"How to Handle Finishing Room Broke"—Round Table Discussion.

NEWSPRINT AND WRAPPING

Chairman—J. J. Priest, Albemarle Paper Manufacturing Company, Richmond, Va.

"High Speed Refining"—Edw. M. Root, Dilts Machine Works, Fulton, N. Y.

"Management and Control"—Arthur B. Green, Needham, Mass.

"Pulpers and Refiners"—Shartle Bros. Machine Company, Middletown, Ohio.

PLANT AND POWER ENGINEERS

Chairman—F. W. Johnson, Rhinelander Paper Company, Rhinelander, Wis.

"Steam Turbines for Paper Mill Application"—K. S. Kramer, Westinghouse Electric and Manufacturing Company, Philadelphia, Pa.

"Horsepower Requirements for Preparation of Various Paper Stocks" — Dr. Manson Sutherland, Sutherland Refiner Corporation, Trenton, N. J.

MILL SUPERINTENDENTS ASSOCIATION, WARDMAN PARK HOTEL, WASHINGTON, D. C., THURSDAY EVENING, JUNE 15, 1939.

"Modern Steam Generators"—Prof. A. G. Christie, Johns Hopkins University, Baltimore, Md.

TISSUE

Chairman—Hilliard D. Cook, Sweet Brothers Paper Manufacturing Company, Inc., Phoenix, N. Y.

Informal Talk—H. H. Harrison, Crystal Tissue Company, Middletown, Ohio.

Discussion on Questionnaire—"Technical Control for Tissue."

Many of the members visited the Federal Bureau of Investigation.

In the evening a joint dinner and special entertainment in the Continental Room was enjoyed by those present. The music was by the Sidney Orchestra and again Francis D. Bowman was in charge of the entertainment.

Election of Officers

On Thursday, there was a General Conference at about 9:30 A. M. in the Theatre at which time the reports of the Committees were heard and the following officers were elected for the next year.

President, Howard H. Harrison, Crystal Tissue Company, Middletown, Ohio.

First Vice President, Arthur B. C. Drew, The Pairpoint Corporation, New Bedford, Mass.

Second Vice President, Oscar Stamets, Riegel Paper Corporation, Riegelsville, N. J.

Third Vice President, Grover Keets, Marathon Paper Mills Company, Rothschild, Wis.

Fourth Vice President, L. S. McCurdy, National Paper Products Company, Port Towsend, Wash.

Fifth Vice President, S. G. Blankinship, Brown Company, Berlin, N. H.

Secretary and Treasurer, R. L. Eminger.

Killey E. Terry, S. D. Warren Company, was appointed as the new member of the Finance Committee.

Two papers were presented, one the "Application of Flexible Doctors to the Paper Machine" by Fred Lodding, Lodding Engr. Corp., Worcester, Mass, and the other "Making Calcium in Water Behave." This paper was presented with movies in color by Dr. R. E. Hall of the Hall Laboratories.

At the Men's Luncheon on Thursday, F. G. French, President of the French Paper Company, Niles, Mich., acted as toastmaster and presented the speaker, George K. Gibson, sales manager, Mosinee Paper Mills Company, Mosinee, Wis. His subject was "Our Amazing Industry," and dealing with the necessity of paper in our everyday lives.

Joint Banquet

In the evening the joint banquet was held with W. M. Shoemaker, Secretary of the National Vulcanized Fibre Company, Yorklyn, Del., acting as toastmaster. He called upon Fred C. Boyce to present the President's Jewel and the L. D. Post Trophy in the form of a beautiful watch was presented by John Cornell to F. L. Zellers.

The high point in the evening was the address given by W. J. Cameron, Ford Motor Company, Detroit, Mich.

"If the United States sinks," he said, "why, the New Deal sinks with it.

"But if the New Deal sinks the nation floats free. I expect this nation to float free."

He urged businessmen in general to show enterprise.

It was decided by the board of directors in early session before the convention that the next convention of the American Pulp and Paper Mill Superintendents Association would be held in Cincinnati, Ohio.

Ladies Program

A delightful and diversified program had been arranged for the ladies. They were thrilled by their visit to White House after which a luncheon was served at the Mayflower. In the afternoon a bus trip was made to the U. S. Capitol, Supreme Court Building, Library of Congress, Folger Shakesperian Library and the various Embassies and Legations. As the weather was not exactly fitting for a boat trip in the evening, entertainment and dancing were provided at the Wardman Park Hotel.

On Wednesday various groups of ladies played golf, went sightseeing or shopping. Many were attracted to the Federal Bureau of Investigation where guides explained just how the G-Men operate. There was also Ladies Bridge and on Thursday a

MEN'S LUNCHEON AT ANNUAL CONVENTION OF AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION

Fashion Show which also attracted many of the men.

Convention Committee

The convention committee which did an excellent job was composed of the following gentlemen:—General Chairman, F. L. Zellers; Convention Manager, G. W. Craigie; Program, A. G. Stone; Finance, K. E. Terry; Sports, L. D. Nicholson; Arrangements, W. M. Shoemaker; Ladies' Entertainment, Mrs. James Fish; Men's Entertainment, F. D. Bowman; Reception, H. H. Harrison; Boat, E. J. Thom.

Draper Tropical Hat

The Draper Brothers Company, manufacturers of woolen felts, Canton, Mass., presented all the members of the association with a tropical hat which was gratefully accepted and quite commonly worn.

Papers in Technical Section

Many of the papers presented at the convention are printed in full in the Technical Section of this week's issue of the PAPER TRADE JOURNAL on page 71.

Pulp and Paper Machinery and Supply Firms Exhibit at Washington, D. C.

Activated Alum Corp.

The Activated Alum Corporation, 80 Broad street, New York, exhibit featured its new-type alum, known as Standard Activated Alum. A large sign built especially for the meeting formed the background for the display with a welcome to those attending. Glass samples of the new-type alum in order to show its appearance as compared with the regular paper makers alum were distributed to those interested, and on the table were various types of literature and special signs enlarged and photostatically reproduced from current trade journals giving an idea of the position activated alum now occupies in the field two years after its introduction. The activated alum in its original form was first introduced to the water treatment field through the means of a traveling research laboratory, the first of its kind in the world. This trailer in its completely remodeled form was open to all for inspection outside the hotel during the course of the meeting. This was of interest to the superintendents whose plants treat their own water, as the trailer is provided with the latest type of technical apparatus used in connection with the purification of water.

Allis-Chalmers Mfg. Co.

The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., in its booths displayed motors and starters, its revolutionary speed changer unit and various pumps especially applicable to the paper industry. The chief feature of the exhibit was the company's recently announced type PO stock pump. This new pump is designed so that its complete rotating element may be readily withdrawn from the casing without disturbing the section or discharge piping connections or the alignment of the pump and motor which are mounted on a common base. R. N. Landreth of Allis-Chalmers, Washington, D. C., district office, was in charge of the exhibit assisted by Frank Forrest, well known Allis-Chalmers paper mill pump engineer from the home office in Milwaukee.

American Meter Co., Inc.

The American Meter Company, Inc., 60 East 42nd street, New York, exhibited instruments for the measurement of steam, gas, air and liquids, which are covered by Bulletin E-3 on Indicating Flowmeters, Bulletin EG-2 on Recording and Integrating Flowmeters, Bulletin AG-3 on Wet Test Meters for laboratory purposes.

Bagley & Sewall Co.

The Bagley & Sewall Company, Watertown, N. Y., exhibit of paper machine equipment consisted primarily of two machine models. One was the Simplex Quick Wire Change Fourdrinier improved design. This model was arranged to actually show the quick wire change features. The other model on display was one of the new Control-Flow Cylinder Vats, which also contained moving parts. Other features included general descriptive literature and photographs, of the company's paper making machinery. Messrs. Kinne, Hayes and Pennock were in attendance.

Beloit Iron Works

The Beloit Iron works, Beloit, Mich., displayed an illuminated background featuring pictures of recent Beloit installations and also featuring a new arrangement of the Beloit horizontal dual press, incorporating an additional roll acting in conjunction with the first suction press making three nips instead of two. In other words the dual press has been improved to where its efficiency is equivalent to three presses instead of two presses.

Bird Machine Co.

The feature of the Bird Machine Company, South Walpole, Mass., exhibits was an actual, full size Bird Purifiner on display for the first time in this country. The Bird Purifiner is a new device for removing both light and heavy dirt from paper stock, and judging by the attention it attracted at the Show it bids fair to be as popular and important an item of Bird machinery as the well known Bird Screen and Bird Centrifiner. The Purifiner effects a remarkably thorough separation of both heavy and light dirt by making use of a difference in pressure of the stock entering and leaving the machine. Those who inspected it commented on its simplicity and compactness and the fact that it had no moving parts. Much interest was also created by its unique construction in that it employs two distinct separations, one of which collects and removes the light dirt and foreign matter in a way that is not accomplished by any other equipment of this character. The Bird exhibit also included a new and attractive full scale working model of Vickery Doctor applications to various types of papermaking rolls. Another new item that attracted much interest was an improvement in the Bird Self-

Cleaning Shower Pipe which eliminates the usual wear of shower pipe holes.

Giant photo mural cut-outs of the latest model Bird Screen, Bird Save-All, Bird Centrifiner and Vickery Felt Conditioner added much to the attractiveness of the Bird Machine Company exhibit.

Bristol Co.

The Bristol Company, Waterbury, Conn., exhibited a new single-case Time-Temperature Controller, recording and indicating. The instrument is one of Bristol's complete line of Pyromaster recorders and controllers. These instruments have a new and simplified operating mechanism for measuring millivoltage potentiometrically or as a resistance thermometer. A Pyromaster with transparent cover for the operating mechanism was exhibited to demonstrate the features built into these instruments. Other instruments for bleaching and refining, for the digester, the acid plant and for other pulp and paper mill processes, where close control is essential, were featured. These included Bristol's: New pH Recorder Controller, Potentiometer for recording 6 or 8 temperatures on one chart, new Portable Recording Voltmeter, Electric Flow Meter, Beater Recorder and a new Pneumatic Telemeter.

Cameron Machine Co.

The Cameron Machine Company, 61 Poplar street, Brooklyn, N. Y., exhibited a collection of rolls in the company's booth which vividly showed the extent to which paper strip in roll form is used in today's paper converting industry. Literally every kind of paper ever wound or rewound on the company's Camachine Winders was represented in the display.

Chromium Corp. of America

The Chromium Corporation of America, 120 Broadway, New York, exhibited typical applications of Crodon plate to standard pulp and paper mill equipment. These illustrated the wide variety of better-known chromium-plated parts as well as the latest developments in surface finishes which are important adjuncts to successful plating technique. Of special interest were the newly-developed "open grain" finishes by means of which closely-controlled uniform

OSCAR STAMETS
Second Vice president

patterns of minute indentations are obtained. Such surfaces, although externally flat and smooth, nevertheless retain sufficient moisture to afford complete release of stock. They have not only proved especially effective in reducing troublesome adhesion on press rolls, drying drums and similar equipment, but have also facilitated cleaning operations.

Coe Mfg. Co.

The Coe Manufacturing Company, Painesville, Ohio, exhibit consisted of a Drainator display unit wherein an electrical boiler, completely enclosed, was generating steam at 20 pounds, the steam pressure being reduced to 10 pounds and passing through a condensing unit which condensed about 8 pounds of steam per hour. This condensate, under pressure, was then passed through a Drainator which had glass on both sides at which point the pressure on the condensate was reduced to atmosphere. The condensate and flash steam then were carried to a small open receiver in which a float was located which operated the boiler return pump returning the condensate to

A. B. C. DREW
First Vice president

GROVER KEETH
Third Vice president

WHY LET DIRTY ROLLS SPOIL IT?

When your paper has gone all through that long and careful and costly processing isn't it a shame to allow any of it to be turned into seconds or throw-outs by a dirty roll? Particularly when it costs so little to keep the roll eternally shining and spotless with a Vickery Doctor.

There is a Vickery Doctor engineered to guarantee continuously efficient performance from every roll on your machine. The paper it saves quickly pays for the installation.

May we send you the layouts and estimates?

BIRD MACHINE COMPANY, SOUTH WALPOLE, MASSACHUSETTS

VICKERY DOCTORS

the boiler. The Coe Drainator is a condensate drainer and an integral part of the Coe Drainage System for paper machines. This paper machine Return System is being sold exclusively by the Black-Clawson Company of Hamilton, Ohio and Shartle Brothers Machine Company, Middletown, Ohio.

Crane Co.

The Crane Company, 836 South Michigan avenue, Chicago, Ill., displayed both large and small valves in its line of products of interest to the paper industry. T. H. Ireland represented the company.

Department of Commerce

An exhibit depicting major trends in the American wood pulp and paper industry was on display in the main lobby of theWardman Park Hotel, on June 13, 14 and 15 as part of the Commerce Department's participation in the twentieth annual convention and exposition of the American Pulp and Paper Mill Superintendents' Association. The exhibit, prepared by the Forest Products Division of the Bureau and Domestic Commerce, traces the development of the pulp and paper industry in the United States. Among the prominent features of the display were informational charts showing the growth of pulp production in the states of Washington and Louisiana; the gain in importance of kraft wood pulp from fifth place in total United States wood pulp production in 1928 to first place in 1938; outstanding position of the state of New York as the center of paper production; and the leading paper and pulp commodities exported together with leading foreign markets for these products.

De Zurik Shower Co.

The DeZurik Shower Company, Sartell, Minn., exhibited its complete line of Easy Operating paper and pulp mill valves, including two-way valve, three-way valve, and angle valve made of iron, bronze and stainless steel. Several large rubber lined valves were displayed as well as valves equipped with operating cylinders for remote control installation. A full size DeZurik Shower was displayed including a cutaway sectional sediment strainer for installation at the shower inlet. In the shower exhibit were several instantly cleanable trim squirts together with full range of large spray nozzles such as are used on pulp grinders, flat screens, wood washers, etc. The wood cleaning machinery exhibit consisted of large size illustrations of their Knot Boring Machine together with pieces of pulpwood before and after cleaning on the Knot Borer and samples of dirt which are removed from the wood by the machine. A full size DeZurik Stock Consistency Regulator was exhibited with stuffbox made of cypress and copper and entire regulating unit made of bronze such as is their standard construction for installation ahead of paper machines, Jordans, and flushing systems, pulp mill applications etc. David DeZurik and Otto Goeppinger were in attendance at the booth.

L. S. McCURDY
Fourth Vice president

Duriron Co.

The Duriron Company, Inc., Dayton, Ohio, exhibit was divided into three sections, each displaying equipment for a specific application in the pulp and paper industry as follows: For alum dissolving and handling, there were exhibited Duriron pumps, valves,

S. G. BLANKINSHIP
Fifth Vice president

R. L. EMINGER
Secretary-Treasurer

Improved!

BELOIT HORIZONTAL *Dual Press*

PATENTS PENDING

● The Beloit Horizontal Dual Press has been improved by incorporating a primary roll over the first suction press, adding another nip. Thus, this press is now equivalent to three presses instead of two, the first suction roll doing double duty.

● The success of the Beloit Horizontal Dual Press has been definitely established. This new press gives even better results.

THE BELOIT WAY BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS. **IS THE MODERN WAY**

BELOIT IRON WORKS BELOIT WISCONSIN

pipe, fittings, and alum dissolving jets. For hypochlorite bleaches and chlorinated water, there was shown equipment of Durichlor, an alloy that is highly resistant to hydrochloric acid. For sulphite, sulphate and kraft pulp mills, stainless steel equipment, such as pumps, valves, pipe fittings, and special castings were exhibited. Representatives were by W. H. Scott, general sales manager; G. A. Baker, alloy steel sales, and R. M. Shields, factory sales representative.

Edgar Bros. Co.

Edgar Brothers Company, 50 Church street, New York, in a booth near the registration desk displayed a small clay exhibit. The booth was furnished around a standard carrying a large block of crude clay which was taken from the company's mines in Georgia, showing the source of the company's products to the paper industry. Around the walls of the booth there were shown interesting photographs taken of the various processes and clay mining equipment.

Foxboro Co.

The Foxboro Company, Foxboro, Mass., exhibited a new method of Remote Stuff Gate Control, improvements in the Verigraph Moisture Control System and a complete system for Alkaline Pulp Cooking Control. A working model of the Foxboro Remote Stuff Gate Control demonstrated the ease and precision with which adjustments in basis weights can be made at the weighing table. This table is equipped with a gauge calibrated to read gate position. Recording gauge charts give permanent records of gate openings for any particular run and enable the operator to know exactly the amount of change in setting at or from any particular opening. Much interest was shown in the new hygrometer and hygrometer element designed for the Verigraph Moisture Control System. The hygrometer is much more compact and therefore more adaptable to small clearances. It is designed so that the moisture can be measured anywhere across the sheet by sliding the hygrometer on a C-shaped swing mounting. An additional refinement in the new hygrometer is the plug-in type element that may be replaced in the same manner as a radio tube. This new element is made of material that has essentially the same characteristics as paper being measured. Foxboro also announced a complete new system for Alkaline Pulp Cooking. The interesting feature of this system is that the Top Relief Controller relieves all excess pressure from the beginning of the cook. Other equipment included in the Foxboro exhibit was the pulp grinder control, and pneumatic loading for presses, calenders and supercalenders.

General Electric Co.

The General Electric Company, Schenectady, N. Y., exhibit featured novel applications of magnets, including two of the displays which are now forming a part of the G-E exhibits at the New York World's Fair and the Golden Gate International Exposition. "The floating bowl" amazed and amused all who saw it. Taking a page from the Arabian Nights, General Electric scientists devised an apparatus which actually floated a large aluminum bowl in space. The bowl could be lifted and replaced and would continue to float. Developed in the research laboratory as a result of studies on the application of electro-magnetic induction to non-magnetic metals, the equipment consisted of concealed coils producing a powerful magnetic field. Eddy-currents induced in the bowl by this field produce an opposing field strong enough to lift the bowl as high as six inches above the concealed magnets.

Also demonstrated were small magnets which "ran around in circles". The animated magnetikins, as they have been called, are small Alnico magnets which are placed on a flat, stationary, non-magnetic disc, below which is an iron or steel disc that is free to rotate and carries a number of more powerful Alnico magnets of alternate polarity. The small Alnico bar magnets on top of the stationary disc tend to align themselves with the magnetic field produced by the large magnets below. Thus when the small magnet is directly over a large magnet, it stands on end, and as the large magnets are whirled around, the small magnets on top somersault end over end. By way of showing the practical application of laboratory research, a small generator using Alnico magnets in its field structure was on display. Such generators are widely used as pilot generators in paper machine drive. A prominent feature of the G-E booth was a splash-proof induction motor, which lends itself to extensive use in paper mills. Representatives included: W. W. Cronkhite, F. M. Roberts, Schenectady; W. L. Hilfrank, Boston; F. E. Winslow, J. W. Sholder, Philadelphia; E. S. Cassedy, Washington; and M. T. Lawrence, Grand Rapids.

Great Western Mfg. Co.

The Great Western Manufacturing Company of Leavenworth, Kansas, operated a Type V Combs Gyratory Liquid Screening Machine, actually screening liquids similar to coatings, colorings and lime solutions, to show similar operations in paper mills. This little unit has a 20¾ inches diameter sieve, and suspends by a hook from a single point. It operates with only a 1/6 hp. motor, and because of its gyratory, vibratory motion has an enormous capacity. This is the first time such equipment was shown at any of the conventions. It is already in operation in a number of the large paper mills, and the results are reported as being very satisfactory. No brush or artificial pressure is used, and therefore no foreign substance is forced through with the good material. For extremely large capacities a Giant V-5 machine was also shown, having a 36 inches diameter sieve, and operated with a ½ hp. motor. A small laboratory sifter was also operated to show how samples usually sifted by hand could be sifted mechanically making as many as 16 separations with one operation of the machine. This laboratory sifter operates with the world famous Combs Gyratory motion, assuring 100 per cent perfect sifting results.

Heppenstall Co.

The Heppenstall Company, Pittsburgh, Pa. and Bridgeport, Conn., displayed some of the special alloy knives which are produced from its patented analysis steel and made in high frequency induction furnaces. They are well known throughout the steel industry for their high quality forgings and to the metal trades for shear knives of outstanding performance. The special knives which the company has developed over the last four or five years for the pulp and paper industry are natural developments to meet the increasing demands for extra quality and service. In attendance at the booth were S. B. Heppenstall, Jr., general manager in charge of sales

Clays for Coating and Filling

English China Clays Sales Corporation

551 FIFTH AVENUE, NEW YORK

and John Brown, engineer, from the Pittsburgh Plant; C. P. Robinson, special representative, New York City; and Edmund Norman and Roger Burke of Edmund Burke & Sons, Boston, New England and New York State representatives.

Hydro Silica Corp.

The Hydro Silica Corporation, Gasport, N. Y., exhibited its high pressure cleaning unit for the maintenance of suction press and couch rolls, flat screens and screen boxes, beater bars and vats, stock chests, rotary screens, etc. The company also displayed its special self-propelling pipe cleaning nozzle with which stock, water and caustic soda pipes can be cleaned without mechanical devices within the pipe and without dismantling of the pipe line. Aerated water at 1000 pounds pressure through its special nozzle removes scale, slime and other deposits, and the nozzle draws the hose through the straight pipe, around elbows and curved sections.

Ingersoll-Rand Co.

The Ingersoll-Rand Company, Phillipsburg, N. J., exhibited their Class EGV heavy-duty stock pump. The exhibit unit was cut-away and operated very slowly to show the method of construction. Additional exhibits included an open-impeller Motorpump for light paper stock, a closed impeller Motorpump for general paper mill service, a typical boiler-feed pump, an air ejector, and a small air compressor. Literature on these and other products manufactured by Ingersoll-Rand for the paper industry, including Diesel engines, pneumatic tools, condensers, air compressors, and vacuum pumps was available at their booth.

International Nickel Co.

The International Nickel Company, Inc., 67 Wall street, New York, exhibited Monel-covered paper machine rolls as the principal feature of its display. This new development which by a pressure welding process applies a solid Monel sheet metal cover to rolls for protection against corrosion, rust and wear, has proven its economy and success in many installations made by the prominent paper machine builders. An exhibit of the standard mill forms of Monel, and of save-all pans, suction boxes, perforated screens, dandy roll covers, jordan bars, "K" Monel doctor blade, alum measuring tanks, pails are among the items of established Monel paper mill applications. F. L. LaQue, E. A. Turner and T. E. Lagerstrom were in attendance.

Johnson Corp.

The Johnson Corporation, Three Rivers, Mich., exhibited a novel demonstrator which showed the action of a syphon pipe in a rotating cylinder. The cylinder on the demonstrator was of glass and rotated at 150 r.p.m. A pump is used that forces water and air into this rotating cylinder. The syphon pipe was connected to a separating trap which discharged to atmosphere. By the differential between the 2 or 3 pounds pressure that was built up with the air and atmospheric pressure, the water that has been placed in the rotating cylinder was discharged the same as it would be on a machine in operation. The Johnson Rotary Pressure Joint on the demonstrator was the company's one inch—300B and of the same general construction as was regularly furnished for paper machines.

Kidder Press Co., Inc.

The Kidder Press Company, Inc., Dover, N. H., exhibited its standard Super-speed Slitter and Roll Winder which, while operating on a principle somewhat different from other machines on the market, handles almost any kind of paper with equal facility, including glassine.

They emphasized the three desirable features of the ruggedness of their machine which lends itself to accurate winding, at high speeds, the shear cut principle, and the low maintenance cost due to self-sharpening principle of cutters. The Junior models which take up to 65 inch webs, operate at 1,800 feet per minute, and their Senior heavy duty models will take webs up to 120 inches at 2,300 feet per minute. A model showing the company's shear cut principle, was on display in the booth. G. E. Holmes, of the Dover office, W. C. Glass, New York office, and Brooke Shaughnessy, New England representative were in attendance.

Samuel M. Langston Co.

The Samuel M. Langston Company, Camden, N. J., manufacturer of paper machinery, did not have an exhibit of actual machinery but was represented at its booth by Bryant W. Langston, Harry Goldberg, and Herman Goldberg.

Lehigh Steel Co.

The Lehigh Steel Company, New York, displayed its general line of carbon and alloy tool steels, high speed steels, and special alloy shaftings, both in the hot and polished finish condition. It also exhibited various hand and pneumatic tools, gears, parts, etc., which are made from its steels, and used extensively in the pulp and paper mills throughout the country. A special feature of its exhibit was the display of LECO Non-Tempering Tool Steel, which as the name implies, requires no tempering or drawing whatsoever, thereby, rendering toolmaking practically foolproof. This company also showed a new shape it recently introduced in its "LECO" Steel, which they call Shurgrip. This new shape has been so designed as to give a mechanic a firmer grip on a tool, particularly when working with greasy or oily hands, thus permitting a "sure grip" at all times. Another specialty exhibited was its "Croma" Alloy Steel, highly adapted for heavy duty shaftings and machine parts subjected to undue stress and strain, as well as for divers other uses, which arise in the daily operation of a plant.

Link-Belt Co.

The Link-Belt Company, 307 North Michigan avenue, Chicago, Ill., featured an operating exhibit of the Link-Belt P.I.V. Gear variable speed transmission; a colored translite of installations of conveyors, vibrating screens, and power transmission equipment, at pulp and paper mills; samples of anti-friction roller bearings, pillow blocks, and other power transmission products; Twin Disc friction clutches; and chains for conveyors, drives, barking drums; illustrations of Silverstreak silent chain drives operating beaters, washers, pumps, and other equipment. Representatives in attendance were, George M. Sharer, Horace Bowman, Harry D. Mitchell, of Philadelphia; H. D. Alexander, William J. Nighbert, of Baltimore and Henry F. Weber, Chicago.

SULPHUR

Angle of Repose	35°
Atomic Weight	32.065
Atomic Number	16
Boiling Point	444.6°C. 832.28°F.
Compressibility	13.1 x 10^{-6} per atm. 20°C. (100-500 atm.)
Density	Rhombic 2.07 at 20°C. Monoclinic 1.96 at 20°C. Liquid 1.808 at 115°C.
Melting Point	Rhombic 112.8°C. Monoclinic 119.0°C.
Weight	Bulk: 84 to 90 lbs. per cubic foot Liquid: 113 lbs. per cubic foot

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

Lodding Engineering Corp.

The exhibit of the Lodding Engineering Corporation, Worcester, Mass., was devoted mainly to the display of working models of Lodding Doctors furnished with Lodding pneumatic oscillating equipment. Of chief interest were two Lodding oscillating doctors in operation upon two such different roll surfaces as Stonite and Chromium Plate. The former roll was running partially submerged in a tray containing water and it was to be observed in a striking way how effectively the oscillating doctor removed the water with but the slightest pressure and with consequently greatly lessened danger of scoring and retarded glazing effect on the roll. The doctor on the Chromium Plated roll was running dry with a blade of phosphor bronze. Especially to be noted was the smooth and highly controllable motion of these doctors as they went back and forth. The speed of oscillation was easily variable from four or five complete cycles per minute up to any reasonable number. Also on display was a pneumatic mechanism for oscillating shower pipes and such miscellaneous pieces of paper machine equipment. There were a couple of very small scale oscillating doctors amid samples and descriptive material of Lodding equipment in general.

Lovejoy Flexible Coupling Co.

The Lovejoy Flexible Coupling Company, 5009 West Lake street, Chicago, Ill., exhibited the company's 1A, W, and WQ flexible couplings. The type WQ was featured as of particular interest for use in paper mills, possessing the advantages of simplicity, strength and requiring no lubrication. The WQ flexible couplings have individual load cushions freely floating between jaws and are held in position by inside steel sleeve and removable spiral steel retainer.

Mason-Neilan Regulator Co.

The Mason-Neilan Regulator Company, 1190 Adams street, Boston, Mass., displayed a representative group of specialized automatic controls for the paper industry. Masoneilan Tenso-Temp Drying Control, Exact-a-Load Roll Loading Control, Weir Meter for measuring flow to sewers, Controls for the indirect and forced circulation method of Sulphite Pulping, transmitter type Stock Level Indicators occupied prominent positions. Other equipment shown included control valves, regulators, indicating thermometers, flow controllers and pressure controllers. Several of the controls were in operation. A. H. Stanton, manager of the pulp and paper sales division was in charge. Also in attendance were J. McAlear and H. C. Earle, Jr., sales engineers.

Magnus Chemical Co.

The Magnus Chemical Company, Garwood, N. J., exhibited products used in paper mills, such as Magnus Slime Remover for the removal of slime, cleaning of screens and head boxes, cleaning of suction couch rolls and cleaning of sand water filters and stock filters. Also exhibited was Magnus Feltex, used in the cleaning and conditioning of felts. Magnus Beatex was also exhibited as a wetting agent, which, if added in the beater, permits defibering and improves flocculation and formation in paper or board. The new "Paper Mill Cleaning Handbook" was on display and available for all who desired a copy.

Morey Paper Mill Supply

The Morey Paper Mill Supply Company, Boston, Mass., featured various types of Brandon drier felts, Fitchburg screen plates, Sheehan carrier ropes, several types of paper machine aprons and deckle, and other paper mill accessories and supplies. The new Lightweight "Zephyr," an open-back 3-ply drier felt, is the highlight in the display of Brandon felts. The "Zephyr" is designed to cut steam consumption and back-pressures, improve the sheet through "continuous stage drying" and often permits faster speed in operation.

An attractive display of Fitchburg Screen Plate Company Screen Plates featured the New Type patented plates with "Duplex Slots," various other styles and types of slots, chromium-plated plates, and an interesting display of plates Reclosed and Recut, including Bird Screen plates. By recutting only a portion of these plates, it is shown what can be done in comparison with the original worn condition of the plates. There was a complete display of "Resisto" paper machine aprons, an interlined rubber apron which is now in use in more than three hundred paper mills in the United States. Also shown was the Vulcan pure gum rubber apron and several styles of white enamelled apron cloth. Sheehan Carrier Rope in both American and Egyptian Cotton, and both plain and graphite treated was shown. Other accessories, including Deckle webbing, were also shown to advantage. In attendance were Edward H. Hall and G. Bancroft Hall of the Morey organization. Edward Hall is also president of the Fitchburg Screen Plate Company, whose products were shown.

Mt. Vernon-Woodberry Mills

Mt. Vernon-Woodberry Mills' patented reinforced drier felt was stressed by this organization in their booth. Large display signs pointed out that while it was only slightly over six months since Mt. Vernon-Woodberry Mills had announced that all experiments on this new felt had been completed and they were then ready to accept orders, that already eighty mills had purchased one or more Woodbury 887's and some mills had already reordered as many as ten to twenty felts apiece. These display signs then went on to give statistical data on the performance of the first forty-two felts in use where complete records were available. Fourteen of these had effected savings for paper mill owners on drier felt costs of from 10 per cent to 25 per cent. Fourteen effected savings from 25 per cent to 50 per cent and eleven had effected savings of from 30 per cent to 75 per cent. In this manufacturer's booth was an effective display of the advertising which had been used to promote Woodberry 887. Full page advertisements used in all the trade papers reaching the paper industry, together with appropriate broadsides which had been sent direct to paper mills generally, as well as to operating heads. A new folder, entitled "Woodberry 887 Marches On" was distributed at this booth, giving the same statistical data as that which was displayed on signs. Turner Halsey Company, of 40 Worth street, New York, selling agents for Mt. Vernon-Woodberry Mills, report that Woodberry 887 reinforced drier felts have brought a greater and more enthusiastic response from paper mill men than anything which has been offered to them in this field for many years.

THIS BEARING *Resists* CORROSION, OXIDATION, ABRASION AND WEAR!

MADE OF
"K" MONEL
(NON-MAGNETIC)
OR
STAINLESS STEEL

NEW TYPE BANTAM QUILL BEARINGS

SHAFT SIZES 1/2" to 5" CARRIED IN STOCK

Provide high load carrying capacity in limited areas . . . Easy to install . . . Low cost. Exclusive features include (A) One-piece channel-shaped outer race, (B) Specially designed curvilinear trunnions on rollers, (C) Improved method of roller retainment, (D) Simplified design with all fragile parts eliminated, (E) Supplied with or without hardened and ground inner race.

IF you have a bearing problem which calls for exceptional resistance to corrosion (salt water or acid), oxidation, abrasion and wear, it will pay you to investigate Bantam's K-MONEL and Stainless Steel bearings, made especially to meet these trying service conditions. In addition, the K-MONEL bearings are non-magnetic. Both are available in Tapered Roller, Straight Roller and Ball Bearings and have proved completely successful in a wide range of applications. Your inquiry is invited.

BANTAM BEARINGS CORPORATION SOUTH BEND, INDIANA

Subsidiary of THE TORRINGTON CO., Torrington, Conn.

TAPERED ROLLER—STRAIGHT ROLLER—BALL

BANTAM

BEARINGS

Nash Engineering Co.

The Nash Engineering Company, South Norwalk, Conn., exhibited a high pressure compressor which is a new development. It operates on the well known "Hytor" principle, utilizing a rotor revolving in an eliptical casing without metal to metal contact. The displacing action is obtained with water which is introduced as a sealing and cooling agent. This pump delivers, clean, cool air at pressures up to 80 to 90 pounds per square inch. It can be equipped with an unloading device so as to function automatically to maintain a predetermined pressure in a receiver. It operates at speeds which allow it to be direct connected to a standard commercial induction motor. Through the use of the Nash compressor oil and dust is eliminated from the air and it is usually possible to do away with after coolers which have heretofore been required with other types of machine. To illustrate the internal construction and method of operation of the Nash compressors, as well as vacuum pumps, which are so widely used throughout all parts of pulp and paper mills, a disassembled unit was shown. This comprised the body only, and one head complete with its cone. A rotor and shaft were also available for inspection. This exhibit brings home to users of Nash pumps their extreme simplicity and rugged construction. The absence of metal to metal contacts in the pump make for long life and continued high efficiency. A feature at the Nash booth was a glass centrifugal pump, suitable for handling acids or any liquids which are corrosive to metals. The unit comprised a pedestal mounted cast iron shell with all parts which might come in contact with the liquid of glass. Formal release of this equipment to industry has just been made. At present the glass pump is built in one size, having a capacity of about 100 GPM but additional sizes may be developed as the need arises.

Oakite Products, Inc.

The Oakite Products, Inc., 22 Thames street, New York, exhibited improvements in methods and materials designed to facilitate cleaning and related paper mill operation and maintenance work. A photographic display was utilized to dramatically present the application of Oakite materials to such work as cleaning suction press rolls without hand drilling, washing of felts, cleaning Fourdrinier and cylinder wires, grinding calender rolls, and pressure cleaning of machinery before overhaul. The newly developed Oakite solution-lifting steam gun was also on exhibition. This unit, it is said, has been designed especially for cleaning before major overhaul work, and cleaning miscellaneous paper mill machinery parts before repair. Those in attendance included J. J. Basch, Philadelphia and Southeastern division manager; M. L. Shorey, Maryland sales representative; and V. D. Smith, technical division, New York office.

Process Controls, Inc.

Process Controls, Inc., Le Roy, N. Y., exhibited two models of the new Meyers Consistency Controllers. The two models shown were the P-9 and P-10 machines designed for small and medium capacities respectively. Two larger sizes are available, known as P-8 and 3P-10 models, the latter of which will handle upwards of 12,000 lb. per hour without sampling. Meyers Consistency Controllers operate and condition all of the stock in transit. In some instances, however, they may be arranged to operate upon a sample, for instance, where a large volume of stock is moved in a few minutes as commonly met with in slush stock systems supplying beaters. They are, in addition, adapted to regulation in a pressure system, and the company is prepared to study, design and build adaptations of the standard machines for any condition or capacity. S. E. Meyers, chief engineer of the company was in charge of the exhibit.

Paper Makers Importing Co., Inc.

The Paper Makers Importing Company, Inc., Easton, Pa., exhibit consisted of an electric display machine flashing photographs of the different operations in the preparation and shipping of Cornish and American clays. There was also on display several samples of various grades of Cornish and American clays.

Penick & Ford, Ltd.

Penick & Ford, Ltd., 420 Lexington avenue, New York, had on display a complete line of their products, made from American corn. They also had numerous samples of paper and board in which their products had been used, either in the beater, tub sizing, laminating or corrugating operations.

Pittsburgh Plate Glass Co.

The Brush Division of the Pittsburgh Plate Glass Company, Baltimore, Md., had on exhibition a working model of a section of a Fourdrinier machine, demonstrating the use of the Fourdrinier wire brush, whose duty it is to help keep the Fourdrinier wire clean. This presented a great deal of food for thought, and their representatives advise they will be very glad to further discuss the personal problems of the various mills. In addition, there was a display of various types of brushes, principally painters' tools, which are practical for use in both maintenance and industrial work. One portion of this display showed the various steps in the manufacture of a well made paint brush.

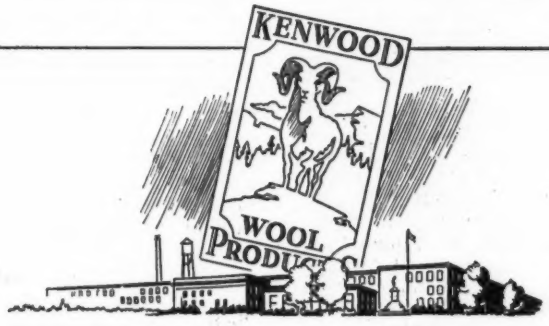
The Pusey and Jones Corp.

The Pusey & Jones Corporation, Wilmington, Del., exhibits included an operating model of Puseyjones 1939 Improved Quick-Change Method of installing Fourdrinier wires, now being incorporated in the new machines building for Southland Paper Mills, Inc., Lufkin, Texas, and Hollingsworth & Whitney Company, Mobile, Alabama; Operating model of the new Puseyjones Form-Flow System comprising the Stream-Flow Vat, Flow Spreader, Up-Flow Head Box and Flow Mixer. In the Quick-Change Method the Fourdrinier as a unit remains in operating position. Unnecessary detach or disconnect brace stands, shake, suction hose or showers. Two removable under-carriages, motor operated, support the main fourdrinier structure in perfect alignment at all times, without danger of deflection stresses and distortion as with complete removable or cantilever types. The under-carriages are rolled into the tending aisle on suitable tracks set at or below floor level. The tracks across pit remain stationary. Small hinged track on each under-carriage required to swing to one side during draping of wire, then back to normal position. The under-carriages form the main support for the end brackets and stands supporting the poles carrying the wire, which is draped in the tending aisle from a special buggy device suspended from the overhead

At New York—

THE WORLD OF TOMORROW

Here, at the greatest of all expositions, are assembled the wonders of the modern world. Here is abundant evidence of the amazing contributions of modern research to better communication, transportation, production, distribution, health — evidence, too, of what the swift advancement of our time promises in new wonders for tomorrow.



At Huyck's Mills—

THE FELTS OF TOMORROW

Here is the largest and most modernly equipped felt manufacturing plant in the world. Here, step by step, choice fleeces gathered from the four corners of the earth are converted by intricate processes into finished felts. And here modern research is continuously contributing to the needs of the paper industry—applying each new discovery in making better felts for tomorrow.

F. C. HUYCK & SONS

KENWOOD FELTS • ALBANY, N. Y.

traveling crane. After fully draped, the wire loop is transported over the fourdrinier, when the undercarriages are rolled back into normal operating position, after which wire poles and brackets are removed, breast roll and stretch roll adjusted to take up slack. The Stream-Flow Vat permits increased drainage and mold head, therefore the ability to form a sheet at high speed. The vat circle is adjustable, allowing the flow conditions to be made most suitable at every point around the mold, permitting the improved formation of both slow and free stock. This control of velocities permits a wide range of sheet characteristics at will. The outer vat circle also serves as a last approach flow-pass before the making board. The Flow Spreader follows correct hydraulic principles in spreading the flow across the width of the vat. The cross sectional area is reduced as the flow is widened. This nozzle effect produces a quiet flow of uniform velocity at every point across the machine and insures an automatically level sheet without any adjustment on the part of the machine tender. The whole top is hinged, also necessary hand-holes in the side provided for easy wash-up. The Up-Flow Head Box removes air and provides a large free surface for feeding the vat steadily. The Flow Mixer assures intimate and uniform mixing of the new stock with the white water and re-circulated stock so that the flow to the vat will be of uniform consistency throughout.

Warren Steam Pump Co., Inc.

The Warren Steam Pump Company Inc., Warren, Mass., exhibited a single stage pump for handling liquors. The pump, known as the Warren type "L" liquor pump, is fitted with a case liner on the suction side to take up wear when handling thick and corrosive liquors and this piece is easily replaced. Stuffing boxes are extra deep and are arranged with a large water chamber for effectively cooling the stuffing box when handling very hot liquors. One of the chief advantages claimed for this type of pump was that of accessibility. The pump is so designed throughout that when repairs must be made the pump is kept off the line for the shortest possible time. To remove the rotating member it is unnecessary to break a joint in either suction or discharge line, and it is not necessary to move the motor. The liquor handling parts of the pump can be furnished of special alloys of iron, steel, or bronze.

Republic Steel Corp.

The Republic Steel Corporation, Cleveland, Ohio, and its subsidiary, Steel and Tubes, Inc., also of Cleveland, joined together in exhibiting their products. Republic, which is said to have the world's largest capacity for stainless steel, centered its display on the use of Enduro Stainless Steel in various items pertinent to the pulp and paper industry. The firm displayed a number of articles manufactured from corrosion resisting Enduro. Steel and Tubes, Inc., exhibited their Electrunite Pressure Tubes of ordinary steel and Enduro Stainless Steel of various analyses, including the 18-8-S-Mo analysis which has proved so successful in the pulp and paper field. Included in the exhibit was a small hydraulic press which was used to crush small samples of Electrunite Boiler Tubes, illustrating the remarkable ductility and strength of the tube.

Rice, Barton & Fales, Inc.

Rice, Barton & Fales, Inc., Worcester, Mass., provided a booth where new and old friends could meet in comfort. They had a special pictorial exhibit illustrating their numerous products and some of the recent developments on paper making machines. A device which has been attracting considerable attention for some months is a new type of automatic dryer felt guide. To demonstrate the simplicity and positive action of this it had in the booth a working model of the guide. A siphon pipe Installator and a new flexible tip slice were also demonstrated in model form. Illustrated bulletin showing other products were available for distribution.

Sandy Hill Iron & Brass Works

The Sandy Hill Iron and Brass Works, Hudson Falls, N. Y., included a model Sandy Hill Bertrams Flow Distributor, a model Sandy Hill Bertrams Shake and a section of the Neilson adjustable slice lip was exhibited as well as photographic displays of outstanding Sandy Hill items. These items included the adjustable cylinder mould paper mill machine, hypoid and spiral bevel gear drives, tissue machines and Kamyr equipment which comprised bleaching systems, high capacity wet machines and presses, continuous pocket pulp grinders, rotary suction boxes and other miscellaneous items.

SKF Industries, Inc.

The SKF Industries, Inc., Front street and Erie avenue, Philadelphia, Pa., exhibit featured a drier cylinder mounting. This mounting, of the type that has been used on all kraft machines built for the southern mills during the last three or four years, permits shafts to expand and contract without imposing extraneous thrust loads on bearings or side frames. The bearing mounting for the driving side was of the split pillow block construction, machined to stabilize a self-aligning roller bearing axially so as to hold the cylinder against endwise movement. The bearing mounting for the tending side consisted essentially of three movable supports on which the bearing housing rested. This construction permitted the housing to move axially within the necessary limits with extremely little friction, and yet maintain the shaft at a constant center height. With the three pieces giving three-point support, there was definite assurance of absolute stability to the bearing housing. The supports themselves were capable of carrying enormous loads, many times the working loads of the drier cylinders.

Socony-Vacuum Oil Co.

Socony-Vacuum's enviable position in the field of pulp and paper making machine lubrication was reflected in the interest shown in its exhibit at the convention. This comprehensive display of oils, greases and process waxes—a complete line specially suited to the needs of the pulp and paper making industry, could only be possible for a company with Socony-Vacuum's seventy-three years' experience. Those decades of lubricant pioneering and development, and the accumulated field knowledge of an expert staff of engineers and specialists, have given the Gargoyle emblem of Socony-Vacuum products high rating wherever pulp and paper are made.

Stickle Steam Specialties Co.

The Stickle Steam Specialties Company, Indianapolis, Ind., exhibit featured the new Stickle Auto-

Cowles Classifiner

IS PAPER MAKING AN ART or is it an exact science? In either case there are certain principles in the preparation of paper pulp that must be adhered to. The problem is to carry out the necessary steps as efficiently and economically as possible.

The constant demand for better papers has necessitated new production methods and improved machinery. At the same time, keen competition calls for the lowest possible overhead costs, while turning out the finest quality paper.

Since 1868, when we produced our first Beating Engine, we have kept pace with the paper making industry. During these 71 years we have been designing pulp preparation equipment to operate with minimum power consumption and to do the job required, as exacting paper mill engineers demand that it should be done. The Dilts-built Cowles Classifiner is one of these units.

The Cowles Classifiner is exclusively Dilts-built. Scientifically designed and expertly constructed, it embodies 71 years of Dilts engineering experience and skill, resulting in a highly efficient unit for defibering and clarifying waste paper stock.

The Cowles Classifiner uses only one-tenth the space and much less power than is usually required for equipment producing the same volume of work. It is designed to fit into systems now in use—permitting a change-over at low cost. The unit is so constructed that it is easily and quickly taken apart for inspection or repairs.

Ask our engineers to discuss your production problems with you. A solution may pave the way to further improvements in stock preparation.

Dilts

DILTS MACHINE WORKS, Inc. FULTON, N. Y.

matic Tension and Thermal Control showing simplicity of this control and its application to the old type tension control. Also showing the new line of Stickle Valves, The Improved Micro Adjustable Orifice with thermal control and temperature indicator for checking the flow of condensate and temperature as it leaves the driers; the complete line of Stickle Traps including the New Stickle Series 100 trap which has the internal by-pass, internal strainer and straight-in-line installation which eliminates fitting and the necessity of installing strainer ahead of the trap, with the improved Sight Glass which checks the complete operation and indicates syphon or trouble which might cause improper and sluggish drainage.

Sturtevant Mill Co.

The Sturtevant Mill Company of Boston, Mass., exhibited a full size Poirier Control, mounted on a steel stuff box. To better understand the operation of this control, an animated picture was shown. This illustrated the flow of stock through the box and control, with the mingling of the dilution water and stock for controlling consistency. These are built in four different sizes and can handle practically any tonnage. Their usual application is preceding a machine to control weight. This they can do very effectively. Another application is controlling consistency through a jordan to reduce the freeness-slowness changes on the stock emanating from the jordan. These machines are supplied on a liberal approval contract, whereby the mill becomes the sole judge as to the machine's performance and acceptance. Another piece of equipment shown was the Sturtevant Multi Drop Leg. This device embodies seven discharge pipes, and is attached to the suction pipes of the wet boxes on a Fourdrinier machine. Dispensing with the use of the pump, suction is provided by sufficient drop below the machine to obtain the necessary vacuum required. By its use variations in the quantity of water available for discharge from a wet box is thus assured of being disposed of, without the limitations present in a single pipe. Each pipe works independently of the other, as an efficient suction Unit in itself. Owing to the size of the Sturtevant Bale Pulper, it was impossible to exhibit the actual machine, but photographs of this successful piece of equipment for completely defiberizing bales of sheets of pulp were shown.

Taylor Instrument Companies

Taylor Instrument Companies, Rochester, N. Y., exhibited their standard line of indicating recording and controlling instruments, as well as several outstanding special applications developed during the past several years. Among the special developments shown were the Taylor Pulp Grinder Temperature Controller for use on all sizes and types of wood pulp grinders, including the control valve with the special non-closing feature and stainless steel bulbs of special design and different lengths; the Taylor Thermo-Pressure Time Schedule Controller for use on soda pulp and sulphite pulp digestors; charts cut to a typical cooking schedule on a sulphite pulp digestor shown in operation plotting actual chart record of this important process. The Taylor Beater Roll Pressure Recorder was also shown complete with two different designs of roll pressure measure elements, which make it possible to install the instrument on all makes and types of beaters. The Taylor Pressure Roll Load Recorder, complete with diaphragm type measuring element, and the Taylor Calender and Super-Calender Load Indicator and Recorder, shown complete with a special design load measuring element, make it possible to indicate or record the actual pressure exerted on the top roll bearing by the weight and lever arrangement or by any other means of side pressure. This feature of the instrument eliminates entirely any error in chart records caused by friction at any point due to the weight and lever arrangement. Another and unusual development brought out by the Taylor Instrument Companies in the past year was shown for the first time. This instrument, to be used on a Jordan engine, was the Taylor Pulp Plug Pressure Recorder, which accurately measures and records the pressure at which the stock is processed.

Wallace & Tiernan Co., Inc.

The Wallace & Tiernan Company, Inc., Newark, N. J., concentrated its exhibit on slime control and prevention in paper mills by chlorination and ammoniation and on microbiological control in paper mills manufacturing stock for food containers and food wrappers. Unusual interest was shown in microbiological control provided by full mill-wide use of the Chloramine process.

Westinghouse Electric & Mfg. Co.

The Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., exhibit displayed Micarta table rolls, covers, doctor blades, suction box covers, and other products. Motors, controls and instruments also were prominently shown. Unlike wood, rubber or metal, Micarta is improved by the presence of water. Doctor blades of Micarta do not crack, split or score the rolls, and Micarta suction box covers are almost frictionless to make the screens slide more easily and wear longer.

Also displayed were socket-type electric instruments, circuit breakers, the famous De-ion fuse, splashproof motor, pushbuttons and controllers of various types. G. D. Bowne, manager of general mill electrification, was in charge of Westinghouse activities.

May Reorganize Port Mellon Plant

[FROM OUR REGULAR CORRESPONDENT]

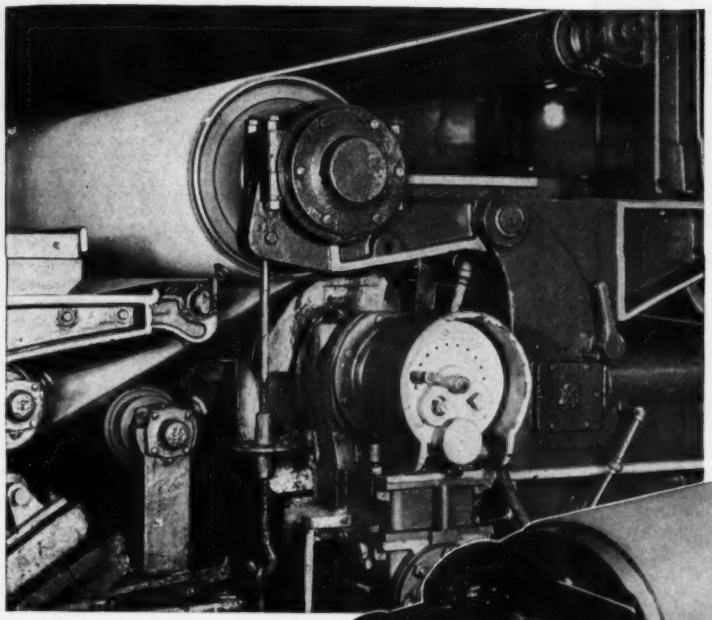
VANCOUVER, B. C., June 17, 1939.—Reorganization of a large pulp plant and sawmill at Port Mellon, B. C., with a view to resuming operations was indicated recently when Knox Walkem, K. C., on behalf of the Montreal Trust Company, obtained a judgment against Vancouver Kraft Company Lta. from Chief Justice Morrison in Supreme Court at Vancouver, B. C., and an order for the sale of the properties.

The sale will be conducted by the registrar of the court at the Courthouse.

Montreal Trust Company sued as trustee for bondholders whose claim totalled $1,143,000 for principal and $600,000 for interest. There is also a prior mortgage registered against the properties for about $400,000.

The bonds were issued eleven years ago and the Vancouver Kraft Company Ltd. operated the pulp mill for about seven months until the Sino-Japanese hostilities shut off purchases from Japan and the plant again closed down. Bondholders are working on a reorganization plan and expect to form a new company to take over the properties.

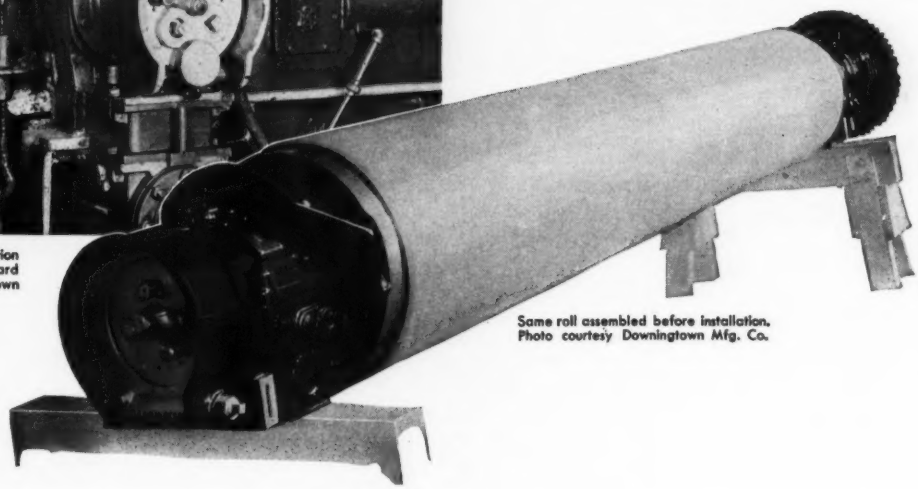
Further Evidence of the Value of Experience



Manhattan Rubber Covered Suction First Press and other Rolls on a board machine. Photo courtesy Downingtown Mfg. Co.

MANHATTAN RUBBER COVERED SUCTION ROLLS

Provide the Way to a Better Product



Same roll assembled before installation. Photo courtesy Downingtown Mfg. Co.

Condor PRODUCTS

- Compensated Belt
- Conveyor and Elevator Belt
- V-Belt
- Air Hose
- Acid Hose
- Fire Hose
- Oil & Gasoline Hose
- Steam Hose
- Suction Hose
- Water Hose
- Molded Rubber Goods
- Oilless Bearings
- Screen Diaphragms
- Industrial Brake Blocks and Lining

- Abrasive Wheels

Here is just one of over 150 Suction Rolls rubber covered by Manhattan and specified by profit-wise executives to help cut paper-making costs and increase the marketability of product.

Perhaps you have already ordered a Manhattan Rubber Covered Suction Roll for your mill. If you have, here is what to expect when it is installed:

Increased Speed and Tonnage because Manhattan Suction Rolls are trouble-free and especially prepared for hard service.

Low Felt Costs because their uniform and resilient covering provides the perfect nip for maximum water removal without crushing.

Long Roll Service because Manhattan's unique method of applying the rubber covering prevents it from coming loose — some of our rolls have been in continuous service for over five years.

Regardless of whether one of these rolls is bound for your mill or not, these are good reasons why you should specify Manhattan Rubber Covered Suction Rolls on the next order you give your machine builder. Write now for complete information.

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES AND FACTORIES

Those Who Attended the Convention

A

Ralph Abercrombie, Cheney Bigelow Wire Works.
Mr. and Mrs. Ernest H. Abernethey, Southern Pulp & Paper Journal.
C. G. Albert, Edgar Brothers Co.
Fred E. Augustine, Gaylord Container Corp.

B

C. L. Bachelder, Hercules Powder Co.,
Miss Susan Badzer.
R. R. Baker, Westinghouse Electric and Mfg. Co.
M. L. Barker, Beckett Paper Co.
Mr. and Mrs. Emmett Barney, Cornell Wood Products.
T. M. Barry, Fraser Paper, Ltd.
Ray L. Barton, Michigan Paper Co.
J. J. Basch, Oakite Products Corp.
H. Thos. Baughman, West Virginia Pulp & Paper Co.
B. M. Baxter, Bevis Machine Co.
Mr. and Mrs. F. K. Becker, Bird Machine Co.
L. J. Beckmann, Allis-Chalmers Mfg. Co.
Mr. and Mrs. L. C. H. Beighey, Hammermill Paper Co.
Mr. and Mrs. H. F. Bennett, Gardner & Richardson Co.
E. H. Berges, Farrel Birmingham Co.
F. N. Beveridge.
George W. Bluett, General Refractories Co.
Mr. and Mrs. B. Beasley, Brown Paper Mills Co., Inc.
Mr. and Mrs. David Blanchard, Magnus Chemical Co.
Geo. A. Bogle, Central Fibre Products Co.
J. M. Booth, Huron Milling Co., Inc.
Mr. and Mrs. W. Gordon Booth, Tonawanda Boxboards, Inc.
F. C. Boyce, Wisconsin Paper & Products.
A. R. Boyd, F. C. Hutck & Son.
Miss Ethel Bradley.
Samuel M. Bratton, Pusey & Jones Corp.
Mr. and Mrs. Herbert A. Brown, Howard Smith Paper Mills.
Mr. and Mrs. L. H. Breyfogle, Draper Bros. Co.
Mr. and Mrs. Wm. H. Brydges, (also Betty and Richard), Bedford Pulp & Paper.
Mr. and Mrs. Ralph E. Briggs, Draper Brothers Co.
J. R. Buchanan, Harriman Co.
J. C. Bullard, Corn Products Sales Co.
Mr. and Mrs. J. J. Burke, Bird & Son, Inc.
H. C. Burnett, Newhaven Pulp & Board.
Mr. and Mrs. H. H. Burrows, Manhattan Rubber Co.
DeHaven Butterworth, H. W. Butterworth & Sons Co.
Mr. and Mrs. M. N. Bennett,
S. G. Blankinship, Brown Co.

C

A. J. Callanan, Walker Brothers.
E. W. Camp, National Aniline & Chemical Co.
A. N. F. Campbell, Timken Roller Bearing Co.
Mr. and Mrs. W. L. Campbell, Draper Bros. Felt Co.
C. H. Campion, R. T. Vanderbilt Co.
W. H. Cape, S. D. Warren Co.
Mr. and Mrs. William F. Carr, Jos. Parker & Son Co.
Mr. and Mrs. Albert H. Carroll, Raxquette River Paper Co.
J. E. Carruthers, Interlake Tissue Mills Co., Ltd.
Mr. and Mrs. Charles Champion, Millers Falls Paper Co.
A. B. Clark, Ross Engineering.
C. L. Clark, Nash Engineering Co.
J. J. Clark, Texas Co.
Mr. and Mrs. A. W. Cole, Rex Paper Co.
F. H. Cole, Walworth Co.
C. M. Connor, Valley Forge Laboratory.
Mr. and Mrs. Joseph A. Constance, Millers Falls Paper Co.
Mr. and Mrs. H. D. Cook, Sweet Bros. Paper Co.
A. M. Cooper, Westinghouse.
Harold G. Cornell, American Meter Co.
John Cornell, *The Paper Mill.*
Geo. E. Corson, Clinton Co.
Maxwell M. Craig, McDowell Paper Mills.
John J. Creeden, American Wringer Co.
Mr. and Mrs. William Croft, Esleek Mfg. Co.
Mr. and Mrs. J. F. Cronin, Cheney-Bigelow Wire Works.
Donald C. Culver, Brown Instrument Co.
Mrs. W. H. Croft.
C. H. Champion, R. T. Vanderbilt Co.
Edwin W. Clark, E. C. Atkins & Co.
S. Clayman, Clinton Co.
Ward Converse, Crane Co.
Lester W. Crouse, Penick & Ford, Ltd.

D

John C. Dabney, Harris-Seybold-Potter Co.
P. E. Daley, Eastwood Nealley Corp.
Mr. and Mrs. M. W. Dangel, Lovejoy Flexible Coupling Co.
B. W. Dean, E. D. Jones & Sons.
Mr. and Mrs. Harry Deffer, Standard Paper Co.
C. D. DeMers, Taylor Instrument Co.
George H. Detwiler, Heller and Merz.
T. E. Dial, Socony Vacuum Oil Co., Inc.
Mr. and Mrs. J. A. Dickinson, Crane Ltd.
J. D. Dickson, R. T. Vanderbilt Co.
Mr. and Mrs. Frederick A. Dieckbrader, American Pulp & Paper Mill.
J. C. Dieffenderfer, Hercules Powder Co., Inc.
Mr. and Mrs. G. A. Disbro, W. S. Tyler Co.
P. A. Donaghy, Corn Products.
Mr. and Mrs. J. H. Dow, Castle & Overton.
Mr. and Mrs. Lewis Dozier, Rhinelander Paper Co.
Audrey Dozier.
Mr. and Mrs. F. W. Drake, Lockport Felt Corp.
Mr. and Mrs. Arthur B. C. Drew, Pairpoint Corp.
C. K. Drury, Yale & Towne Mfg. Co.
A. J. Dubuc, Turner Halsey Co.
Mr. and Mrs. Chas. J. Dupuis, Provincial Paper Co., Ltd.
David DeZurik, DeZurik Shower Co.
Mr. and Mrs. Charles Dillingham.
F. F. Dority, J. R. Booth, Ltd.

E

Jacob Edge, Downington Mfg. Co.
Frank B. Eilers, Orr Felt & Blanket Co.
Mr. and Mrs. K. I. Ekholm, National Aniline & Chemical Co.
E. A. Ellis, Downington Mfg. Co.
Mr. and Mrs. R. L. Eminger, Sec'y, American P. & P. Mill Supts. Ass'n.
L. H. Everlien, Appleton Woolen Mills.

F

F. M. Foster, Williams-Gray Co.
Mr. and Mrs. Herbert F. Freas.
Mr. and Mrs. Harry D. Frost.
J. V. Fahey, Ontario Paper Co.
M. Farrel, Farrel Birmingham Co., Inc.
Mr. and Mrs. L. E. Fitzgerald, Hercules Powder Co.
S. W. Fletcher, Ross Engineering.
Frank Forrest, Allis-Chalmers Mfg. Co.
J. D. Fraser, Weyerhaeuser Paper Co.
L. D. Frisbie, Westfield River Paper Co.
N. M. Frisch, Stein Hall & Co.
Mr. and Mrs. F. F. Frothingham, Bird Machine Co.
Albert E. Fuller, H. & T. McClusky.

G

Bowne Garrett, Westinghouse Electric Mfg. Co.
S. E. Gewin, Bristol Co.
E. C. Gildenzoph, Schmidt & Aultt Paper Co.
G. E. Gillespie, DuPont Co.
W. L. Gilman, Brown Co.
Otto J. Goeppinger, Warren Steam Pump Co., Inc.
Harry Goldberg, Samuel M. Langston Co.
Herman Goldberg, Samuel M. Langston Co.
Philip H. Goldsmith, Pusey & Jones Corp.
E. H. Grasse, Farrel Birmingham Co.
W. E. Greene, Stowe Woodward, Inc.
A. E. Griffin, American Cyanamid & Chemical Corp.
Mr. and Mrs. Alan H. Griffin, Riegal Paper Corp.
Thos. W. Gulley, Magnus Chemical Co.
Chas. J. Gunther, Stickle Steam Specialties Co.
A. C. Gault, W. S. Tyler Co.
H. L. Garvens, Chromium Corp. of America.
P. J. Gerardi, Shartle Brothers.
Mr. and Mrs. R. I. Gillespie, Maxwell (Pa.) Co.
B. W. Graham, Activated Alum. Corp.
L. L. Griffiths, Williams-Gray Co.

H

G. Bancroft Hall, Morey Paper Mill Supply Co.
Murray Harris, Lehigh Steel Co.
Mr. and Mrs. H. H. Harrison.
Mr. and Mrs. J. D. Haskell, Dilts Machine Works, Inc.
Mr. and Mrs. C. F. Haskins, F. C. Huyck & Sons.
H. A. Horan. Penick & Ford. Ltd.
R. W. Hamilton, Nashua River Paper Co.
Wm. G. Hamilton, Jr., American Meter Co.
George W. Hardaker, Sinclair Co.
J. F. Harding, Shuler & Benninghofen.
S. S. Harkavy, Geigy Co., Inc.
Ray E. Harter, R. T. Vanderbilt Co., Inc.
Charles W. Hayden, Hayden Wire Works, Inc.
D. F. Hayes, Lawless Bros. Paper Mills.
Mr. and Mrs. John H. Hayes, Waterbury Felt Co.
H. J. Heinstadt, Corn Products Sales Co.
John D. Henderson, Fritz Publications.
Miss Dorothy Hertzog.
Arthur L. Hobday, Southworth Paper Co.
Mr. A. S. Hocker, S. D. Warren Co.
Roy Holden, Stowe-Woodward, Inc.
George E. Holmes, U.P.M.-Kidder Press Co., Inc.
Clayton Holt, Diamond Alkali Co.
C. I. Horton, R. T. Vanderbilt.
Charles T. Hough, Jr., Walworth Co.
P. E. Howard, Bevis Machine Co.
Miss Kitty Hughs.
W. S. Huss, Acme Steel Co.
Mr. and Mrs. O. F. Hutchinson, Bulkley, Dunton Pulp Co., Inc.
Allan Hyer, Shartle Bros.
Mr. and Mrs. R. W. Hynes, Newton Falls Paper Co.

J

Valdemar Jacobson, National Aniline & Chemical Co.
R. S. Johnston, Pusey & Jones Corp.
R. G. Johnstone, E. B. Eddy Co.
H. Duncan Jones, Manhattan Rubber Mfg. Div.
H. S. Johnston, Fox River Paper Corp.

K

Grover Keeth, Marathon (Pa.) Mills Co.
Mrs. L. F. Knickerbocker, Asten Hill Mfg. Co.
R. W. Kraft, Westinghouse Elec.
J. D. Kain, Flower City Tissue Mills.
L. A. Kaye, Acme Steel Co.
L. H. Kelley, Corn Products Sales Co.
W. A. Kelley, E. D. Jones & Sons.
C. H. Kent, Hercules Powder Co.
Mr. and Mrs. D. M. Kelly, Bloomer Bros. Co.
W. A. Kelley, E. D. Jones & Sons.
Charles H. Kephart, Southern Kraft Corp.
Jack Kilawee, Ontario Paper Co.
Mr. and Mrs. R. E. Kilty, A. E. Staley Co.
Mr. and Mrs. C. E. Kinney, Hercules Powder Co.
W. F. Kinzeler, Harris, Seybold, Potter.
Robert F. Kohs, Detroit Sulphite Pulp and Paper Co.
Mr. and Mrs. Fred Kruse, Albemarle Chesapeake Corp.
Mr. and Mrs. Harry Kruse, Chesapeake Camp Corp.
Ralph W. Kumler, Bennett, Inc.
R. L. Kupter, Black-Clawson Co.

L

G. J. Lane, Edgar Brothers Co.
O. F. Lane, Krebs Pigment Co.
J. F. Leahy, Fitchburg Paper Co.
Herbert S. Leonard, Merrimac Chemical Co.
Ralph M. Leighton, Stowe-Woodward, Inc.
Mr. and Mrs. O. L. LeRoux, Northwest Paper Co.
Harry Larison, Johns-Manville Corp.
Edwin Lindquist, Geigy Co.
John H. Loomis, Heller & Merz.
C. P. Ludington, E. B. Eddy Co.
Mr. and Mrs. C. I. Ludwig, Mead Corp.
Mr. and Mrs. Charles Luginbuhl, Moore & Munger.
Mrs. L. J. LaBarge, Main Seaboard Paper Co.
C. E. Lagden, Howard Smith Paper Mills.
F. L. LaQue, International Nickle Co.
L. K. Larson, Weyerhaeuser Timber Co.
M. Lawrence, General Electric Co.
Ralph T. Lichtenstein, Signode Steel Strapping Co.

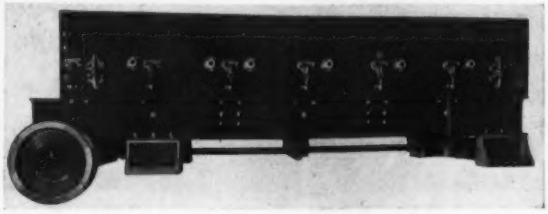
M

W. W. Macklem, Black-Clawson Co.
Milton J. Maguire, Hercules Powder Co.
H. L. Marlow, Texas Co.
G. B. Martin, General Dyestuff Corp.
Hoke Martin, Hercules Powder Co.
Mr. and Mrs. R. B. Martin, Wallace & Tiernan.
Mr. and Mrs. J. M. McAlear, Mason-Neiland Co.
R. D. McCarron, Stein Hall & Co.
Mr. and Mrs. M. McCarthy, Hollingsworth & Whitney.
Mr. and Mrs. John J. McDonald, Browne Co.
R. G. McDonald, Secretary, Technical Association Pulp & Paper Industry.
I. N. McGovern, Forest Products Laboratory.
H. V. Mercready, Magnus Chemical Co.
Ollie W. Messner, Robertson Paper Box Co.
W. K. Metcalf, J. O. Ross Engineering Corp.
Miss Evelyn Meyer.
Mr. and Mrs. R. W. Meyer, Badger Paper Mills, Inc.
Mrs. Leona M. Messner.
R. O. Monroe, Johnson Corp.
W. H. Monsson, Hooker Electrochemical Co.

ADVANCED PAPER MAKING EQUIPMENT

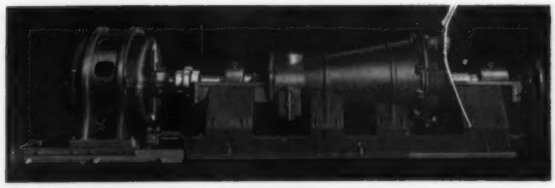
for Lower Operating Costs with Increased Production

ONLY 3 BEARINGS FOR THE DRIVE OF THIS NEW SCREEN

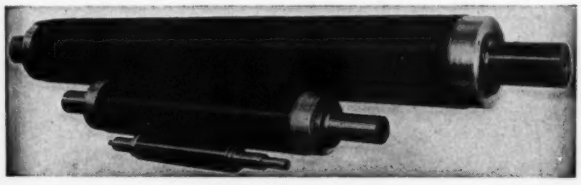


APPLETON - WAGNER DIAPHRAGM SCREEN

No cams, no shaft, no individual eccentrics on this new Appleton-Wagner Flat Screen. Only three bearings for the drive—1 eccentric and 2 roller bearings—operate four screens in line with little power consumption. A simple method of vibrating the diaphragms—rocker action—provides the smoothest performance and easiest operation ever attained on any flat screen, allows rapid vibration without noise or pounding. More stock can be screened without interruptions. Most of the wearing parts of present screen construction are eliminated, only the drive unit requires lubrication. Simplified construction, few wearing parts and smooth operation insure dependable, low cost production with sustained efficiency.

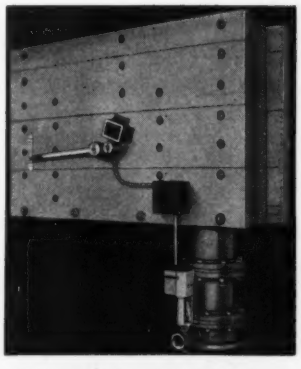


AN IMPROVED JORDAN. For modern paper making there is an Appleton Jordan for every refining requirement on all grades of stock. The shell is designed to safely withstand pressure jordaning. Advanced construction features and an extra margin of structural refinement guarantee correct operation under severe service conditions. The close-coupled motor is an exclusive feature.



FINISHING ROLLS FOR LONG SERVICE. Roll problems in many mills are studied over and over again by Appleton engineers. They are constantly finding ways in which Appleton Calender Rolls can serve you better. Advantage has been taken of every technical advance to build in extra strength for longer wear and more efficient, more economical performance.

CLOSE CONTROL OF BASIS WEIGHT. Used any place where weights must be maintained within narrow limits, Appleton Consistency Regulators guarantee uniform consistency. Regulate at less than 1% up to whatever density can be pumped. Equally effective on rag, sulphite, kraft, glassine or groundwood, on filled or unfilled papers. Stabilize paper machine operations.



A FASTER BEATER. The Appleton Vortex Beater has all the features that promote more efficient beater operation—rapid loading and disintegration, fast circulation, short stock travel, low head, thorough mixing, improved beating and hydration, rapid dumping, a short beating cycle, low power consumption, space economy, ease of operation and low maintenance.

Write for descriptive folders

THE APPLETON MACHINE COMPANY

APPLETON • WISCONSIN

Mr. and Mrs. Monroe Morris, Case Brothers, Inc.
T. H. Morrissey, Shuler & Benninghofen.
Mr. and Mrs. A. A. Muir, Mead Corp.
J. M. Murray, Gaylord Container Corp.
S. Nelson Mann, Whirlflex Sales, Inc.
Mr. and Mrs. N. J. MacDonald, Howard Smith Paper Mills.
C. H. McCollam, Timken Steel Co.
Miss Louise E. McGrath, Booth Chemical Co.
Herbert McKay, Alliance Paper Mills Ltd.
S. E. Meyers, Process Controls, Inc.
T. F. Moriarty, Yale & Towne Mfg. Co.

N

William O. Neeb, Geigy Co., Inc.
V. M. Norwood, Johns-Manville Sales Corp.
Mr. and Mrs. A. A. Nyitray, Eastwood Nealey Corp.
Bert R. Neice, New York Color & Chem. Co. Inc.
T. E. Noon, Signode Steel Strapping Co.

O

J. J. O'Brien, *The Paper Mill.*
J. H. O'Connell.
Mr. and Mrs. J. J. O'Connor, Mohawk Paper Mills.
G. E. Osterheldt, Krebs Pigment Co.
Mr. and Mrs. J. W. Outerson, Patterson Parchment Paper Co.
Heth Owen, Albemarle Paper Co.
R. W. O'Rourke, Cleansel Products Co.

P

Mr. and Mrs. Thomas Palmer, Mead Corp.
F. W. Partsch, Ross Engineering Corp.
Robert W. Pattison, American Writing Paper Corp.
G. M. Peterson, Cheney Bigelow Wire Works.
Miss Ina Peterson.
M. W. Phelps, Solvay Process Co.
G. P. Prather, Lagerloef Trading Co.
Mr. and Mrs. J. J. Priest, Albemarle Paper Co.
E. A. Poirier, Sturtevant Mill Co.
Mrs. Harold A. Pratt.

R

George E. Rausch, Interlake Tissue Mills.
J. H. Reed, William E. Hooper & Sons Co.
William Reigers, Beckett Paper Co.
Mr. and Mrs. George H. Rice, Kalamazoo Vegetable Parchment Paper Co.
Mr. and Mrs. H. M. Rice, E. I. Du Pont De-Nemours & Co.
A. F. Richter, Stebbins Engineering Co.
R. C. Ritz, Bevis Machine Co.
J. R. Roberts, DuPont Co.
Mr. and Mrs. James Rogers, 2nd, J. & J. Rogers Co.
Edward M. Root, Dilts Machine Works.
John B. Randolph, Ohio Knife Co.
J. Roslund, Asten-Hill Mfg. Co.

S

C. W. St. Clair, Coe Mfg. Co.
J. W. Sale, Hummel Ross Co.
Mrs. Ethel Savaard.
H. F. Schenk, Wm. A. Hardy & Sons Co.
J. Scheuermann, Cameron Machine Co.
A. M. Schmalz, Thilmany Pulp & Paper Co.
Mr. and Mrs. J. Carl Schmidt, Du Pont Co.
Mrs. Frank Schumaker.
Mr. and Mrs. Norman B. Scott, Orr Felt & Blanket Co.
Emma Shade.
A. C. Shivley, Harris-Seybold-Potter Co.
Wm. H. Sievert, U. S. Govt.
Mr. and Mrs. Harold Sinclair, Bennett, Inc.
H. Sinnigen, E. P. Lawson Co., Inc.
C. P. Slocum, Corn Products.
Frederick E. Smith, Hollingsworth & Vose Co.
Harold A. Smith, Hamersley Mfg. Co.
Richmond W. Smith, Bird Machine Co.
Roscoe H. Smith, Reliance Electric Co.
H. E. Stafford.
S. B. Stafford, Rice, Barton & Fales, Inc.
Mr. and Mrs. A. H. Stanton, Mason-Neilan Regulator Co.
L. M. Start, Rice, Barton & Fales.
John A. Stephens, Chesapeake Paper Bd.
R. C. Stewart, Shartle Bros. Machine Co.
F. A. Stickle, Stickle Steam Specialties Co.
R. R. Stoltz, Westinghouse Electric & Mfg. Co.
Mrs. Frank F. Stoughton, Spruce Falls Power & Paper.
Mr. and Mrs. Charles Schermerhorn, Stowe-Woodward Inc.
John Schuber, Solvay Process Co.
H. Scott, The Durron Co.
C. M. Shipway, Wm. E. Hooper & Sons Co.
A. P. Sieber, Longview Fibre Co.
V. D. Smith, Oakite Products, Inc.
Ben P. Steele, Pennsylvania Salt Mfg. Co.
Lionel M. Sutherland, Sutherland Refiner Co.
P. D. Switzer, Heller & Merz.

T

Miss Jean Taylor.
Mr. and Mrs. A. T. Taylor, Bedford Pulp and Paper Co.
Bruce Taylor.
Banjamin E. Teale, Ancram Paper Mills.
Mr. and Mrs. Killey E. Terry, S. D. Warren Co.
Mr. and Mrs. E. J. Thom, Howard Smith Paper Mills.
Mr. and Mrs. J. L. Thome, Crane Co.
George A. Thompson, Jr., B. F. Perkins & Sons, Inc.
Mr. and Mrs. Fletcher P. Thornton, Stowe-Woodward, Inc.
V. L. Tipka, Hawley Pulp & Paper Co.
Richard Tobin, Pond's Extract Co.
T. W. Toovey, Pennsylvania Salt Mfg. Co.
E. J. Trimbey, Trimbey Machine Works.
E. A. Turner, International Nickel Co.
R. Tutt, Jr., Peter Cooper Corp.

V

H. L. Vandenberg, A. E. Staley Mfg. Co.
Mr. and Mrs. G. J. Van Liew, Socony Vacuum Co.
I. W. Van Kirk, Penick & Ford, Ltd.
Mr. and Mrs. C. C. Van Stry.
Mr. and Mrs. G. W. Van Steenbergh, THE PAPER TRADE JOURNAL.
J. R. Verdon, American Cyanamid & Chemical Co.
C. Vicario, The Nash Engineering Co., Inc.
B. J. Vos.

W

John M. Walsh, American Cyanamid & Chemical Corp.
Kurt Wandel.
A. P. Wandtke, Heller & Merz.
Mr. and Mrs. S. S. Watson, Riegel Paper Corp.
Mr. and Mrs. J. A. Waters, American Wringer Co.
Mr. and Mrs. Washburn Weston, American Wringer Co.
A. Lucian Walker, Texas Gulf Sulphur Co.
A. E. Waugh, United States Rubber Co.
Mr. and Mrs. Fred Wells, Ohio Boxboard.
L. Weiser, National Folding Box Co.
S. C. Wentz, T. H. Glatfelter Co.
H. F. R. Weber, Link-Belt Corp.
Herbert Weeks, Acme Steel Co.
W. J. Weed, Niagara Alkali Co.
Mr. and Mrs. H. E. Wehr, Mead Corp.
Harry E. Weston, Fritz Publications.
A. Wiberg, Gilbert Paper Co.
Mr. and Mrs. J. A. Wiener, Johns-Manville Corp.
Donald E. Wilbur, Walker Bros.
H. A. Wilmerding, Corn Products Sales Corp.
Paul Wilkinson, West Virginia Pulp & Paper Co.
Miss Dona Dean Wolfe.
Mr. and Mrs. W. F. Wolfe, MacSim Barr Paper Co.
G. C. Walton, Downing Town Mfg. Co.
H. C. Weirick, Timken Steel Co.
Dowd William, Whippany Paper Mills.
L. M. Woodside, Albany Felt Co.

Y

K. E. Youngchild, American Cyanamid & Chemical Corp.
Mr. and Mrs. J. W. Youngchild, International Paper Co.

Z

Henry C. Zeni, American Cyanamid & Chemical Corp.
Mr. and Mrs. F. L. Zellers, French Paper Co.
Thelma Zellers.
Mr. and Mrs. George R. Zust, National Oil Products Co.
Henry H. Ziesing, Midvale Co.

Government Paper Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 21, 1939.—Fitchburg Paper Company has been awarded the contract for furnishing the Government Printing Office with 150,000 pounds of manila calendered tag board in 23¼ and 26½ rolls at 6.22 cents. Also the Whitaker Paper Company will furnish 40,000 pounds of yellow sulphite writing paper in 32 rolls at 4.59 cents. Bids for these items were received on May 26.

Whitaker Paper Company will also furnish 42,834 pounds (75,280 sheets) of 38 x 48 jute tag board at 7.3 cents, bids for which were received on May 24.

National Pulp and Paper Company will furnish 300,000 pounds of newsprint paper on 48 inch rolls at 2.425 cents and Barton, Duer & Koch Paper Company will furnish 20,000 pounds of blue calendered tag board in 23¼ rolls at 7.9 cents. Bids for these items were received on May 22.

National Pulp & Paper Company will also furnish 40,000 pounds of newsprint paper in 24 inch rolls at 2.425 cents; Aetna Paper Company will furnish 17,550 pounds (50,000 sheets) of 38 x 48, 50 per cent rag, white ledger paper at 8.67 cents; and Marquette Paper Company will furnish 74,800 pounds (800,000 sheets) of 32 x 42 white sulphite writing paper at 5.18 cents. Bids for these items were received on May 17.

The Printing Office has received the following bids for 50,000 sheets of 22 x 28 white railroad board; Whitaker Paper Company, $21.02 per M sheets; Mudge Paper Company, $22.64; Stanford Paper Company, $21.00; R. P. Andrews Paper Company, $21.00; Barton, Duer & Koch Paper Company, $21.05; and Paper Corp. of U. S., $20.90.

For 23.175 pounds (100,000 sheets) of 75 per cent rag, lithograph map paper; Mathers-Lamm Paper Company, 11.45 cents; Butler Company, 12.36 cents; Paper Corp. of U. S., 11.72 cents; Barton, Duer & Koch Paper Company, 11.12 cents; and Mudge Paper Company, 10.935 cents.

For 5,000 pounds (42,000 sheets) of No. 1, 24 x 36 flat kraft paper; Walker, Goulard Plehn Company, 5.50 cents less 2 per cent; Enterprise Paper Company, 5.181 cents less 2 per cent; Mathers-Lamm Paper Company, 5.63 cents; Whitaker Paper Company, 5.03 cents; and Graham Paper Company, 4.75 cents.

TUFJEL

SPOT-WELD
YOUR FIBRES
NOW

1. ELIMINATE FUZZ
2. NO MORE PICKING
3. GREATER STRENGTH TO WELDED FIBRES
4. GREATER FOLD
5. GREATER MULLEN
6. INCREASED OPACITY
7. GREATER RETENTION CLAY AND FILLER

A. M. MEINCKE & SON, INC.
SEVEN SOUTH DEARBORN STREET
CHICAGO, ILLINOIS

Chicago Market Reports Improved Demand

More Optimism Prevails In Midwest Paper Trade As Demand Broadens Out In Sulphite, Kraft and Some Other Grades of Paper — Federal Reserve Report Shows Gains — Discuss Pre-Packing Plans — Other News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., June 12, 1939—The local paper trade showed continued indications of strengthening during the past week. Despite seasonal declines of a normal character, the undertone showed stability in virtually all lines with demand broadening out in krafts, sulphites and other grades of paper. Sulphites had a fair week with demand slightly better. Krafts moved quietly into the mid-summer season but with good expectations for early fall business. Groundwoods were little changed while newsprints were slightly in better demand according to local newsprint outlets. Bonds and ledgers in general showed more activity while books and covers moved in a narrow but none-the-less more optimistic channel. The board market was reported more healthy. Waste papers continue soft as commitments seem to be fairly well taken care of.

Link-Belt Describes Fair Exhibit

The Link-Belt Company, suppliers to the paper industry, has recently issued information concerning the Link-Belt exhibit at the New York World's Fair. Located in the Metals Building, the prominent exhibit is based on a desire to familiarize the general public with the vital functions of machinery in "making life better for us all". The exhibit is reported to be the most inclusive display ever assembled by Link-Belt-photo murals, translites, dioramas, equipment and operating units in a modern colorful setting occupying about twice the space occupied at the Century of Progress, Chicago. The thirty-one full color illuminated translites, according to the Chicago concern, illustrated the use of Link-Belt products in all of the major industrial fields including paper manufacturing. Conveyors, stokers, cranes, timing chains and other products are thus brought to the attention of millions of Fair visitors.

Reserve Figures Show Trade Gains

Recent reports from the seventh Federal Reserve district of business in the wholesale paper industry show an optimistic trend for April. Net sales for April over the preceding month show a 4.7 gain in

net sales and a 5.2 per cent shrinkage in stocks. Accounts outstanding increased 0.7 per cent while collections were also up to 2.8 per cent as a rather accurate portrayal of the slow improvement in the paper field. In the paper and printing manufacturing industries in the district, the 733 reporting firms in Wisconsin, Michigan, Indiana, Illinois and Iowa showed declines in wage earners and earnings as of April 15 compared with March 15. The 73,018 wage earners earned $2,098,000 to evidence a 0.2 per cent decline in wage earners and a 0.9 per cent decline in earnings for the period.

This is compared to an 0.6 per cent decline in wage earners and 0.1 per cent in earnings for the total manufacturing groups.

No State Labor Legislation This Session

The Illinois Legislature will adjourn June 30 with the certainty that no wage-hour legislation, no Wagner Act, state income tax or other serious impending measures will be enacted upon. Bills providing for these added restrictions and burdens were all dropped from the House calendar last week along with 600 other bills. The Lantz Employment Peace Act was killed ten days ago. Meanwhile, several controversial measures in which the paper industry evidences a keen interest are still very prominent. One of these is the Illinois Trucking Act, proposed by the State Commission to eliminate alledged monopolies and place trucking under a board of control. Efforts to fix rates have been dropped but the measures —House Bills 151 to 155—still include a measure of supervision which is being bitterly contested by the Chicago Association of Commerce, the Truck Association and others.

Discuss Furniture Pre-Packing Plans

A feature event of the June program of the furniture industry, held this week in the Furniture Mart, was a specially called meeting at which time the subject of furniture pre-packing was discussed by a committee of that organization. Members of the industry and their guests were called together by W. S. Baumann, chairman of the National Retail Furniture Association's Committee on Pre-Packing to discuss pre-packing developments in case goods, tables and other furniture and likewise to inspect the pre-packing exhibits on the 17th floor of the Furniture Mart. The meeting, held on June 6, is significant in that it closely follows the formation of the Furniture Prepack Association organized by the container manufacturing industry to increase the use of paper board in furniture packing. The Association, headed by E. A. Throckmorton, general sales promotion manager of the Container Corporation of America, has taken a prominent part in the above mentioned developments in the furniture industry and is also working to establish uniform packing practices within its own industry as well as to cooperate with the furniture manufacturers and retailers in the shipping and handling of containers manufactured by the paperboard industry. At the same time the Association is recommending new specifications for furniture packing to railroad classification commissions and boards.

The June 6 meeting is expected to promote excellent results inasmuch as it was well attended by leading members of the furniture retail and manufacturing divisions.

Swelling THE FIBRE

QUICKLY—ECONOMICALLY WITH PQ SILICATE OF SODA

WHEN you want to hydrate your stock to the maximum in the shortest possible time, use PQ Silicate of Soda. One mill shows a power saving of 20-25%. Other mills keep the same beating time but improve the felting quality of the stock with a resultant increased strength.

The quality finish of a silicate-treated sheet is evident by simply touching it.

Consider these facts, and then judge for yourself the effects of silicate of soda in your papers. PQ Silicate Service can help you.

SILICATES OF SODA

PHILADELPHIA QUARTZ COMPANY

General Offices and Laboratory, 125 S. Third St., Philadelphia, Penna.
Chicago Sales Offices: 205 W. Wacker Drive. Stocks in 60 cities.
Works: Anderson, Ind., Baltimore, Md., Chester, Pa., Buffalo, N. Y., Kansas City, Kans., Rahway, N. J., St. Louis, Mo., Utica, Ill.

PQ

Kimberly-Clark Holds Big Safety Meeting

Over 1,000 Employees Attend Safety Program of Kimberly-Clark At Lakeview Mill Park In Neenah, Wis. — Commission Considers Freight Rates — Institute of Chemistry Students Graduate — Other Mill News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., June 19, 1939—One of the most outstanding of the numerous safety programs of Kimberly-Clark Corporation, Neenah, Wis., was its gathering Wednesday, June 14, at Lakeview mill park at Neenah, attended by more than 1,000 employees. The event was staged under a large circus tent, with activities both afternoon and evening.

Speaking on the question, "Why Do Accidents Occur?" R. A. Hayward, president of the Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich., said 75 per cent of all accidents have a "problem background." Factors affecting a person's ability to concentrate, he said, are fatigue, intensive outside interests, serious family troubles, financial difficulties, serious sickness, dissipation, physical health and "being naturally dumb." Removing these problems is an important factor in building a good safety record, the speaker declared. Discussing "repeaters," Mr. Hayward pointed out that 50 per cent of the accidents occur among 30 per cent of the employees, and 30 per cent occur among 10 per cent of the same employees. Charts were shown to indicate the bearing of fatigue on the number of accidents.

F. J. Sensenbrenner Addresses Meeting

Interesting comments on business conditions were expressed in an address by F. J. Sensenbrenner, president of Kimberly-Clark. This country's deplorable economic condition is based on fear of what may happen in the future, he said. Industries, not knowing what measures the government will adopt, husband resources and don't expand their plants or improve their equipment.

Mr. Sensenbrenner expressed the opinion, however, that Kimberly-Clark could be considered an exception because during the last six years the corporation has operated at nearly 100 per cent and during the last four months it has operated at more than 105 per cent. This high rate of production was credited by him to the peaceful and harmonious relations existing between the employees and management. This relationship, he said, makes for standard and capacity production and combined with fair treatment, it makes for good will to the consumer.

Commenting on business generally, President Sensenbrenner declared that in 1936 when the Supreme Court declared unconstitutional several measures of the administration, business reached nearly 100 per cent, but the following year, confidence in business was shattered and a recession resulted. The election last fall helped to re-establish business so there was some improvement, but that improvement was curtailed somewhat by the war scare in Europe.

The speaker's principal reference to safety work was his praise of S. F. Shattuck, vice-president of Kimberly-Clark, for organizing the company's outstanding safety program. He characterized Mr. Shattuck as the "father" of safety work in the corporation, and called for a rising vote of thanks from the audience.

Ernst Mahler Speaks on Safety

Ernst Mahler, executive vice-president, spoke on "Safety as We See It in Kimberly-Clark," declaring his belief the company partially escaped the depression because employees and management were jointly responsible by performing an honest service to the public which was willing to pay their wages. "By creating good will with the public," he remarked, "the corporation was able to meet its payrolls by selling a service in the form of goods for a profit."

"An Operator Looks at Safety" was the subject of a talk by J. B. Catlin, superintendent of the Badger-Globe-Kimflex departments, who said 98 per cent of accidents are preventable, and 88 per cent of them are caused by man failure.

Another speaker, William C. Knoelk, chairman of the Safety Commission at Milwaukee, Wis., stressed the individual's responsibility in safety. "It is a matter of the individual and his attitude of mind," he said. He urged that employees carry over into the home and traffic the safety consciousness taught them in the plants.

Four employees were awarded gold pins designating 25 years of continuous service without an accident. C. A. Fourness, assistant general superintendent, presented them to Leo Sodolski, George Roll, Alfred Doran and Valentine Strobl.

The manager's trophy was awarded by William Kellett, manager of the Lakeview mill, to the crepe wadding manufacturing department for making the best efforts at accident prevention during the year. This department also received first prize for the best of a series of safety booths erected on the ground, and the paper and finishing department was second. Thirty employees were awarded certificates by Dr. J. B. Mac Laren, chief surgeon of the company, for completing the Red Cross first aid course. Music was furnished by the newly organized and uniformed band of Lakeview mill workers.

Commission Considers Freight Rates

The cause of the paper industry has been taken up by the Wisconsin Public Service Commission relative to proposed freight rate increases now up for consideration by the Interstate Commerce Commission. Representatives of the state commission appeared at an ICC hearing in Chicago last week to point out the importance of the paper industry to the state, citing the fact that in 31 Wisconsin communities nearly 17,000 persons are employed and earn payrolls of more than $2,000,000 per month, not including compensation of salaried officials. The industry is the fourth largest in the state, the commissioners said.

The proposed rate schedule would increase the charge on Wisconsin paper shipments from 1 to 12 cents per 100 pounds.

The state commission pointed out to the federal officials that in the last ten years the industry in Wisconsin has invested $545,000 in new plants and additions to old ones. During the same period Georgia built more than $14,000,000 worth of new paper plants, and Louisiana more than $5,000,000. Low cost labor, cheaper electricity from federal plants, and lower priced raw materials give the south an advantage over Wisconsin industries, the commission's studies showed. The cost per ton of material and labor for one class of paper product is $73.25 in Wisconsin, but only $36.25 in Louisiana.

Practically all the wood used in Wisconsin-manufactured newsprint is imported from Canada and transportation expenses are high, the commission said. In the south vast areas of forests are available "almost in the manufacturer's back yard."

Institute of Chemistry Students Graduate

Twenty students of the Institute of Chemistry received degrees at the commencement exercises last week of Lawrence College, Appleton, Wis., with which the Institute is affiliated. Twelve received the master of science degree and eight the doctor of philosophy degree.

Those awarded master of science degree were: Harold Yale Charbonnier, Upland, Ind.; Theron Tilford Collins, Jr., Greenville, Texas; Fred E. Culp, Columbus, Ohio; Herman Graef, Neenah, Wis.; Kenneth D. Hay, Beverly, Mass.; John F. Hechtman, Globe, Ariz.; Glenn C. Kimble, Norfolk, Nebr.; Shirley R. Parsons, South Paris, Me.; Robert W. Reed, Rochester, N. Y.; George H. Sheets, Washington, Ohio; Robert A. Stillings, Missoula, Mont., and Paul Rogers Wiley, Bronxville, N. Y.

Doctor of philosophy degrees were awarded to: Duncan S. Brown, Langhorne, Penna.; George L. Clarke, Minneapolis, Minn.; Henry P. Dixson, Jr., Des Moines, Iowa; August Erspamer, Gillespie, Ill.; Fred S. Hanson, Chicago, Ill.; Alfred M. Heald, Omaha, Nebr.; Thomas R. Probst, Lock Haven, Pa., and Linton E. Simerl, Chillicothe, Ohio.

At the annual meeting of the college trustees, C. B. Clark of Neenah, Wis., president of the Riverside Paper Corporation, Appleton, Wis., was reelected president of the board. F. J. Sensenbrenner, president of Kimberly-Clark Corporation, Neenah, Wis., was reelected vice-president. Westbrook Steele, executive director of the Institute of Paper Chemistry, was relected executive secretary of the board.

George W. Mead Reelected

George W. Mead, president of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., was reelected president of the Wisconsin Valley Improvement Company at its annual meeting last week at Wausau, Wis. The organization is a cooperative control utility of water power users on the Wisconsin River. John E. Alexander, president of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., was elected to the board of directors.

Other officers and directors reelected are: D. C. Everest, president of Marathon Paper Mills Company, Rothschild, Wis., vice-president; F. W. Genrich, Wausau, Wis., secretary-treasurer; R. G. Walter, Madison, Wis.; S. B. Bugge, general manager of Tomahawk Kraft Paper Company; Allen C. Brown, Rhinelander, Wis.; W. E. Brooks, Wausau, general manager, and M. W. Kyle, Wausau, engineer.

UNITED PIGMENTS

Pure Titanium Dioxide

UNITANE-O

A brilliantly WHITE, pure titanium dioxide possessing excellent . . .

•OPACITY

•BRIGHTNESS

•DISPERSION

Suitable for ALL types of paper ranging from thin printing papers and waxing tissues to coated book and magazine stocks.

UNITANE O—110 was especially developed for paper pigmentation. Its excellent dispersion in water promotes good retention and excellent sheet formation. As a component of the beater furnish, it produces *whiter* sheets of *great brilliance,* and superior printing qualities.

SAMPLES of UNITANE O-110 will be sent promptly upon request.

UNITED COLORS & PIGMENTS

UNITED COLOR AND PIGMENT CO.

DIVISION OF INTERCHEMICAL CORPORATION

NEWARK, NEW JERSEY

SALES OFFICES IN PRINCIPAL CITIES

Crystal Tissue Co. Elects Officers

At a meeting of the board of directors of the Crystal Tissue Company of Middletown, Ohio, on June 13 new officers were elected. The recent death of Zeiber W. Ranck, since 1920 president of the company, necessitated a new lineup of officers. The following were elected: E. E. Grant, president, Miss E. A. Cahill, secretary and treasurer, L. J. Long, executive vice president and general manager, H. H. Harrison, vice president in charge of manufacturing, V. H. Larsen, vice president in charge of sales. At the same meeting John J. Cahill was appointed assistant sales manager.

E. E. Grant, who becomes Crystal's new president, came up through the ranks, having started in the mill in September 1921. Later he headed the Cost Department, personnel and safety work. In 1935 he was elected vice president and held that post until his elevation to the presidency. In addition to his duties with Crystal Tissue, Mr. Grant is active in civic affairs and is chairman of the Middletown City Commission.

Miss E. A. Cahill, secretary of the company since its founding in its present form in 1920, will assume the additional title and duties of treasurer. Miss Cahill is well known as one of the most capable women in the paper industry. She is active in the Business and Professional Women's Club and is past president of the organization.

L. J. Long who becomes executive vice president and general manager started with the company in 1920 in the mill, and for the past fifteen years he has been purchasing agent. Since 1935 he has been vice president of the Crystal Waxing Company. Mr. Long, together with Mr. Grant and Miss Cahill constitute the executive committee of board of directors and it is expected that the thorough training they received under the tutelage of the late Z. M. Ranck will enable them to carry on the successful policies which have made Crystal the largest wrapping tissue mill in the country.

H. H. Harrison who was elected vice president in charge of manufacturing, has been with the company since 1923 and has been superintendent for the past several years. Mr. Harrison is well known among the paper technicians, having recently been elected president of the American Association of Paper and Pulp Mill Superintendents. V. Howard Larsen, since 1931 salesmanager of the company, becomes vice president in charge of sales.

Indianapolis Demand Steady

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., June 12, 1939—Demand in most items of the local paper market is holding steady in spite of the fact that most jobbers are looking for a summer slump to arrive every week. The retail and manufacturing index is showing a trifle more strength and it may be the summer slump will not materialize. It is almost certain now that it will not be as severe as last year, even if it does come.

Jobbers of fine paper report a steady demand for books, covers and ledgers and prices are being held firmly. There appears to be no large orders, but the small ones seem to cover a broader base. Newsprint demand is showing only a fair volume. Lineage has not been as large through the last fortnight as expected in view of June weddings and graduations, but the volume is nearly on a par with last year and prices continue steady.

The past week saw an increase in summer specialty sales. Jobbers report that the elegant packaging of many items this year, which has an eye appeal on the retailers' counters, has done much to stimulate volume. Prices are firm and most jobbers say they will make some money this year in these items. Retailers, while carrying comparatively low stocks, are keeping them well balanced.

Wrapping paper and bags are holding their own, but volume is not what it should be. Many houses report a smaller total volume than last year to date. This may be due to an increase in the number of wholesale outlets.

Building paper and roofing continue to dominate the list insofar as demand goes. This bids fair to be the biggest year these items have had since 1929. In some instances jobbers have had difficulty in filling orders. At that retailers have not been able to build up their stocks and are having difficulty in keeping them balanced. Prices, while strong, are not out of line with the remainder of the building industry and every effort is being made to keep them from skyrocketing. No change was seen last week in the paper stock market. Mill buying is moderate and prices are ruling steady.

Plan To Reopen Pulp Mill at Port Alice

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., June 17, 1939.—Plans are underway to reopen the Port Alice pulp plant of B. C. Pulp and Paper Company situated on the west coast of Vancouver Island. The plant has been closed since the end of April, 1938, due to disrupted markets in the Orient and adverse marketing conditions elsewhere.

Lawrence Killam, managing director of B. C. Pulp and Paper Company, announced recently that about two dozen men have been sent to Port Alice from Vancouver, and with the 100 to 200 men who remained at the mill site while the plant has been closed, it is expected the plant will soon be in shape to resume production.

"I cannot say definitely at this time just what our plans are," said Mr. Killam, "but I expect to be able to make them known in the course of the next few days."

Whether arrangements have been made for a resumption of exports to the Oriental market is not known. At the last annual meeting of the company, Mr. Killam told shareholders that his company was closely watching developments as affecting products produced by B. C. Pulp and that operations would be resumed at the Port Alice plant as soon as conditions warranted.

B. C. Pulp also controls the Woodfibre plant on Howe Sound, which has had two or three shutdowns but has been operating steadily since the middle of February this year.

A little over two years ago the company spent in neighborhood of $500,000 on both the Woodfibre and Port Alice plants to adapt production to new market trends. The Woodfibre mill was equipped to produce bleached pulp as well as unbleached and new steam turbines were installed.

To accommodate increased hogged fuel in its mills, rather than oil, a new conveyor system was installed at the Port Alice plant at about the same time.

Revise Sales Training Program

After a period of six months during which a number of suggestions from the field were considered and acted upon, a completely revised proposal covering the much discussed Paper and Twine Club's Sales Training Program, has been mailed out to the industry. Among the major changes noted is that the originally planned three days sales clinic has been dropped and the price of the course reduced to $65.00, which eliminates the necessity for any underwriting by manufacturers.

Much has been expected of this enterprise, and those who have seen the outline of subjects to be covered say that it delivers in fullest measure. It will constitute, when employed as designed, a very potent stimulus to the welfare of the paper industry.

According to a statement by T. H. Mittendorf, director of the sales training program for the Industrial Training Corporation which was commissioned by the Paper and Twine Club to develop and desseminate the sales training material throughout the paper industry, more than 1200 tentative reservations have already been received. With the release of complete and final details of the program it is expected that enrollments will total several thousand more.

From every section of the paper industry favorable comments are being received over the comprehensive character of the program outline, because it meets effectively a long-felt need of the paper industry. Collecting, collating and writing of material is under the jurisdiction of the staff of the Industrial Training Corporation headed by Dr. Samuel N. Stevens, executive head of the training department. The training material will be read and approved as issued by an industry-appointed Board of Governors, consisting of seven men headed by D. C. Everest, President of the American Pulp and Paper Association.

In connection with the issuance of the final detailed announcement, John L. Richey, executive secretary of The Paper and Twine Club made the following statement:

"It has required quite a long period of time, considerable experimenting and research, as well as a substantial expenditure of money which has been advanced by the Industrial Training Corporation, to organize the type of sales training program that we feel the paper industry is entitled to. Everyone will agree when they see it that it was worth waiting for. Dr. Stevens and the Industrial Training Corporation, whom we commissioned to organize and write the course has done a job worthy of the highest commendation. It is to be hoped that the efforts will be recognized generally throughout the industry by the largest possible enrollments from every section of the industry. The Industrial Training Corporation has lived up to the letter of their agreement with us and the time has now come when the paper industry is afforded an opportunity to show its good faith by making this long discussed enterprise a brilliantly successful actuality."

New England Paper Men Have Luncheon

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., June 12, 1939—A luncheon meeting of the Fine Paper Division of the New England Paper Merchants Association was held at the Boston Chamber of Commerce Thursday, June 8, with Vice-President Frederick G. Lockwood in the chair.

FINLAND SUOMI

REPRESENTATIVES IN U. S. A. AND MEXICO
OF THE
FINNISH CELLULOSE ASSOCIATION
HELSINGFORS, FINLAND

FINNISH WOOD PULP UNION
HELSINGFORS, FINLAND

PULP SALES CORPORATION
230 PARK AVENUE
NEW YORK, N. Y.

PAPER TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

Vol. 108 New York, June 22, 1939 No. 25

COMING EVENTS IN PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Fall Meeting, Syracuse Hotel, Syracuse, N. Y., September 12-14.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

NATIONAL SAFETY COUNCIL, PAPER AND PULP SECTION, Annual Meeting, Atlantic City, N. J. October 16-20.

GOVERNMENT CONTROLS

Some concern has been expressed in the annual addresses given at the commencement exercises at our higher institutions of learning this month of the dangers threatening the democratic form of government. The thought of preserving and safeguarding the liberal form of government we now have, frequently appears in these carefully prepared talks. The changes now taking place in political, social and economic conditions in so many important countries in the world is a challenge to serious thinking. In many foreign lands planned economy is in effect and the play of free enterprise and individual freedom has consequently been drastically restricted.

The great emergency powers which have been granted to our Chief Executive during the past five years are without precedent and warning has frequently appeared that these extraordinary descretionary powers should not be retained by any one man, that they are legislative in character and do not properly belong to the highest executive office in a parlimentary democracy like the United States. It has been pointed out many times that while the United States is in no present danger of dictatorship, the experience of other countries reveals how easily a dictatorship may be established when safeguard after safeguard is relinquished to meet the need of this or that "emergency."

The powers granted President Roosevelt give him authority to devalue the dollar when he so wills, and he can issue three billion in "greenbacks" if he wants to. He can put the United States on a bimetallic standing at any time, by decreeing the free and unlimited coinage of silver. He can fix the value of the silver dollar at any ratio to gold he desires. He can prescribe the rules and regulations under which gold can be held and purchased, transported, melted or treated, imported or exported. He can operate, with the Secretary of the Treasury, a stabilization fund mounting to two billion dollars, and his decisions as to the secret management of this fund are final. He can suspend trading on any stock exchange for a period of ninety days. He can raise or lower up to fifty per cent any tariff imposed by this country on goods imported from any country having a trade agreement with this country. He can spend, subject only to a certain limitation, funds for relief, farm benefits and other similar purposes, which amount to more in one year than was entrusted to the spending of all Presidents in the past.

Although the Administration has been praised for many of its acts which appear not only ill-advised but actually harmful to prosperity by many capable business and financial leaders, such as the silver purchase act, to mention but one of several dubious experiments, it should be obvious that Congress should reaffirm its authority and not delegate them indefinitely to any one man. It is difficult to conceive how planned economy can exist in a democracy as it functions in this country today. Every business man who values individual liberty should resist centralized rule. In the words of Winthrop W. Aldrich, chairman of the board of directors of the Chase National Bank, New York, in an address at Washington and Jefferson College, June 3: "Under a planned economy, because of the impossibility of reconciling all conflicting interests to the satisfaction of all concerned, the welfare of the individual is considered to be unimportant; the individual must be submerged for the good of the 'cause'.

"Government planning inevitably leads to intolerance of minority views and a disregard of minority rights. A government regulating all the details of economic life and doing all the thinking for its people cannot stop at legal technicalities protecting minority interests. The enforcement of the price decisions requires a large and very efficient corps of secret police,—and homes, stores, factories, warehouses, with a carte blanche for exploratory investigations, violates the very essence of democratic principles . . . Costs and prices must be kept in balance. In our complicated, closely interrelated economy, where the price of a finished commodity may reflect the price of literally hundreds of component goods and services, one fixed price invariably entails another. Price fixing, also, inevitably involves the determination of production, administratively. If a price is set too high, demand will fall off and over-production will ensue unless output is limited to the restricted demand.

"And incidentally, when states fix prices and production, serious dislocations occur in the export mar-

kets. If prices of commodities which enjoy a world market are fixed above their price in other countries, exports will be cut off; if they are allowed to sell at the world level, they may be out of line with other domestic prices . . . It is significant that, in the final analysis when governments attempt to set prices, the price mechanism breaks down completely, and is replaced by a reversion to forms of barter trade. Under a regime of governmentally fixed prices the continuance of democratic institutions is impossible . . . For these and many other reasons, I maintain that a democratically 'planned economy' is an impossibility. Free enterprise and democracy must fall together, as they rose together."

Buy Paper Under Walsh-Healey Act

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 21, 1939.—During the week ended June 10, the Government purchased $1,093,593.58 worth of paper and allied products under the Walsh-Healey Act as follows: Cauthorne Paper Company, Inc., Richmond, Va., $9,314.18 worth of mimeograph paper for the Post Office Department; Crane & Co., Inc., Dalton, Mass., [1]$836,435.00 worth of distinctive paper for currency for the Treasury Department; A. P. W. Paper Company, Albany, N. Y., $14,150.00 worth of toilet paper for the War Department; Commercial Envelope Company, Inc., Baltimore, Md., [1]$14,250.00 worth of envelopes for the Government Printing Office; Union Envelope Co., Richmond, Va., [1]$18,956.00 worth of envelopes for the Government Printing Office; United States Envelope Company, Springfield, Mass., [1]$67,003.90 worth of envelopes for the Government Printing Office; Samuel Cupples Envelope Company, Brooklyn, N. Y., [1]$59,847.00 worth of envelopes for the Post Office Department; Murray Envelope Corporation, Chicago, Ill., [1]$17,329.00 worth of envelopes for the Post Office Department; Oles Envelope Corporation, Baltimore, Md., [1]$26,609.00 worth of envelopes for the Post Office Department; and United States Envelope Company, Springfield, Mass., [1]$19,699.50 worth of envelopes and jackets for the Post Office Department.

[1] Indefinite contract other than General Schedule. Purchases to be made if and when needed.

E. T. A. Coughlin Goes with Bryant

E. T. A. Coughlin, as of June 1, has joined the Bryant Paper Company, Kalamazoo, Michigan, and will be in charge of a newly established Service Department. This department will specialize in the development of new papers to meet the requirements of Bryant customers, and to assist Bryant customers in the use of these papers.

Up until June 1 Mr. Coughlin was associated with Pettengill, Inc., a Chicago firm of nationally known printing engineers, as Director of Research of Paper Laboratories, Inc., an affiliate company. Prior to this he was with W. F. Hall Printing Company, Chicago, as counselor on paper, ink and printing problems.

Mr. Coughlin's earlier training was in the book paper industry, where for a period of fifteen years he served as chemist, coating superintendent and Technical Director in different mills.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES [1]

Months	1939	1938	1937	1936	1935	1934
January	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	84.1%	69.6%	90.3%	76.0%	70.5%	.....
April	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	80.3%	69.0%	90.6%	81.6%	69.4%	.....
June	.....	66.0%	87.3%	80.7%	72.3%	.....
July	.....	72.0%	81.8%	77.3%	64.9%	.....
August	.....	77.2%	82.9%	81.5%	70.9%	.....
September	.....	76.3%	78.6%	80.5%	71.9%	58.2%
October	.....	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average...	.....	72.3%	80.6%	81.3%	70.5%	.....
First 23 weeks..	81.2%	67.6%	90.3%	79.0%	69.1%	.....

COMPARATIVE WEEKLY SUMMARIES [1]

CURRENT WEEKS, 1939		CORRESPONDING WEEKS, 1938	
May 6	83.6%	May 7	67.1%
May 13	81.9%	May 14	67.7%
May 20	81.5%	May 21	69.7%
May 27	80.0%	May 28	71.4%
June 3	73.9%	June 4	62.5%
June 10	76.0%	June 11	64.9%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	May 6, 1939	May 13, 1939	May 20, 1939	May 27, 1939	June 3, 1939	June 10, 1939
0% to 50%	60	63	62	54	90	56
51% to 100%	243	240	241	248	201	156
Total Mills Reporting..	303	303	303	302	291	212

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1935	62%	68%	68%	63%	61%	66%	62%
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	....	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1935	67%	71%	77%	71%	61%	66%
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%

Week end. May 6, 1939—68%
Week end. May 13, 1939—65%
Week end. May 20, 1939—65%
Week end. May 27, 1939—66%
Week end. June 3, 1939—57%
Week end. June 10, 1939—66%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

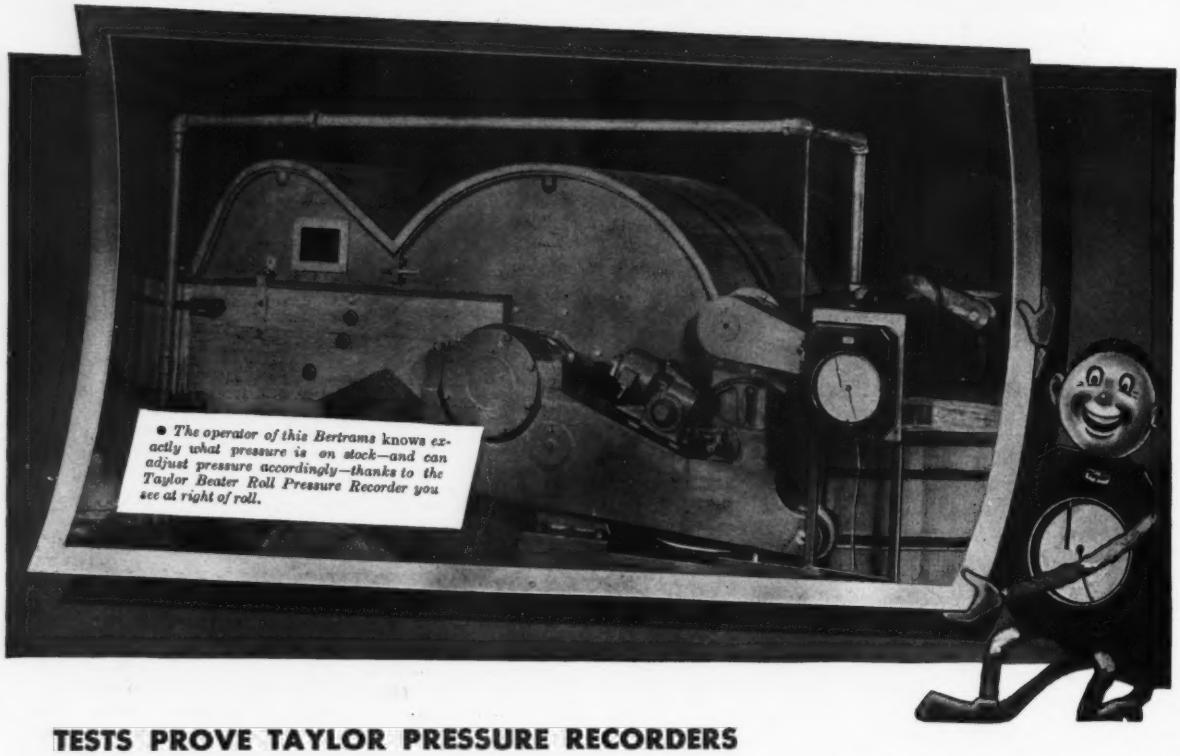
Michigan Paper Stock Co. Opens

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., June 19, 1939—The Michigan Paper Stock Company has started business at 502 North Church street. Approximately 40 persons are expected to be employed in the new firm, which is prepared to grade and pack 2,000 tons per month, according to the operators, William and Leon A. Slavin. This is to be increased later with the demand, they added. Five hundred tons had been stored in the warehouse yesterday.

Two floors totaling approximately 30,000 square feet of space have been reconditioned for the company's operations, which will include Ohio, Indiana, and Illinois territories as well as the Kalamazoo Valley. Latest type hydraulic presses and binders have been installed, and an automatic conveyor system will soon be in operation, owners said. The operators will also act as brokers direct to the mills.

27 MILLS FIND EASY WAY TO BEAT DOWN BEATER BILLS!


● The operator of this Bertrams knows exactly what pressure is on stock—and can adjust pressure accordingly—thanks to the Taylor Beater Roll Pressure Recorder you see at right of roll.

TESTS PROVE TAYLOR PRESSURE RECORDERS ON BEATER ROLLS PAY IN MANY *BIG* WAYS:

YES, 27 leading mills—and 2 laboratories—found it pays handsomely to throw out sounding rods, and other hit-or-miss methods of judging beater roll adjustments and to replace them with Taylor Beater Roll Pressure Recorders! Here's why:

Exhaustive tests were made with a Taylor Recorder installed on beaters to record *actual* pressure on beater rolls—*the only really accurate way to check pressure on stock.* These tests proved that guessing at actual roll position causes uneven regulation that harms paper quality and eats up profits. And guessing can be far from right! One test showed amazed beater operators and superintendents that—unknown to them—pressure on stock varied 4400 lbs. on consecutive beating cycles. And here are the results of other tests:

Taylor Pressure Recorders can cut cost and improve paper quality like this because they write records of exact roll pressure that make possible steady, efficient roll regulation ... that enable engineers to work out ideal pressure and time schedules!

That's how it can pay you, too, to say good-bye to old-fashioned methods of roll adjustment—and put Taylor Beater Roll Pressure Recorders on the job! These precision instruments are easy to install, economical to buy ... and, mills agree, quick to pay for themselves.

So plan to let a Taylor representative tell you more about this modern cost-cutting way to regulate beaters. There's no obligation. And write to us today for more facts. Taylor Instrument Companies, Rochester, N. Y. Plant also in Toronto, Canada. Manufacturers in Great Britain: Short & Mason, Ltd., London.

Taylor Beater Roll Recorders have made possible these savings:

▶ **In one plant a 12% cut in beating time and a 12% increase in beating capacity. In another, a 5.5% cut in power consumption. And in a third, 100% increase in folding capacity. Important cuts in drying costs and more uniform stock.**

Taylor

Indicating Recording Controlling

TEMPERATURE, PRESSURE, FLOW *and* LEVEL INSTRUMENTS

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

The Use and Value of Instruments in The Sulphite Pulp Process*

By C. D. De Mers [1]

Not so long ago, yes, well within the memory of most of us here, an advocate of new methods or gadgets to use as means of assisting the well trained craftsmen in his duties, whether they were in the tanning of leather, the forming of ceramics, the weaving of cloth, or the production of pulp and paper, met with little encouragement and invariably loss of caste among his associates in the industry.

Many of our basic industries were developed by years and, in some instances, by centuries of hard laborious effort on the part of the working members of entire communities. The need of the times created a demand for the many articles produced by the skill of the worker. The obstacles were great and many, but the persistence and patience of the worker made possible the production of mechanical and artistic goods that found a ready market, and even today arouses the tribute of a highly developed mechanical age.

The production methods of the several basic industries bridged the period between the medieval age until late in the last century with very little change in technique or production methods other than the enployment of a greater number of men and the natural development of means to handle and market the product. True, water power and mechanical power replaced the human element in the operation of the production units, but the process as a whole and the quality of the finished materials were dependent entirely on the skill of men employed in and supervising the work.

Early Development of Pulp and Paper Mills

The early craftsman and their descendants and successors, who built and operated the early pulp and paper mills, were literally born to the job, and as family followed family pursuing the same line of endeavor it is not strange that early suggestions of radical changes in methods or equipment met with scant sympathy, and the suggestion of automatic control equipment with even less.

A gradually expanding market made it necessary to increase plant capacity. The need for increased capacity created an interest in greater plant efficiency and encouraged the inventor and machinery manufacturer to design and produce machinery embodying radical new lines and operating principles. The attitude of the craftsman was changing towards new ideas and methods in pulp and paper production, and the rotary sulphur burner, the rotary stock screen, various systems of sulphite cooking, embodying liquor circulation and preheating, centrifugal pumps, higher duty wet presses, and other improvements in both machinery and methods were developed and considered standard equipment in an up-to-date plant of 40 to 50 years ago.

Competition that necessarily follows adequate production and, in all cases, overproduction created another change in the attitude of our craftsmen—an interest in greater economy. In order to reduce conversion costs by deriving the maximum efficiency from the newly developed production units, consideration was given to the use of instruments for indicating, recording and, yes, even controlling some of the more important variables in the plant.

The instrument companies became a part, an important one, in the pulp and paper industry, and the engineers and salesmen at last gained the confidence of the craftsmen. This cooperative effort between the men who knew the problems in the mill and the instrument engineers who knew the possibilities of instrument operation resulted in the development of many practical and important instrument applications.

The information and benefits derived through the use of instruments especially designed for each application make possible a higher average efficiency in plant production and a better control of conversion costs. I would like to consider a few of these applications, starting at the beginning of the process in the acid making plant.

Sulphur Burning Control

While the volume of air required to burn a pound of sulphur is important, it must be admitted that the temperature at which it is burned is at least just as important. It has been said that to burn sulphur at maximum efficiency three definite conditions must be maintained.

A high and uniform temperature
A carefully controlled air supply.
An efficient cooling system.

A check on the temperature in the combustion chamber is important, but it is just as much so at other vital control points in the system, and in order

* Presented at the Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Washington, D. C., June 13-15, 1939.
[1] Industrial Sales Department, Pulp and Paper Division, Taylor Instrument Companies, Rochester, N. Y.

to properly control this process having so direct a bearing on the efficient operation of the burner and the strength of the cooking liquor a recorder designed tor use at each control point is of great importance.

When we refer to vital control points we speak of the temperature of the gas entering the combustion chamber, leaving the combustion chamber, entering the gas cooler, leaving the gas cooler, entering the acid tower, etc.

Liquid Level Recorders

The raw liquor from the acid tower to the settling and storage tanks represents in a sense the capacity of the system, and the level maintained in these tanks is important as a check on the continuity of operation. The level of the other liquor storage and reclaiming tanks is also important as a check on the relieving operation and the reserve available in the event of an interruption in the acid-making system.

We have developed an instrument for recording liquid level under atmospheric pressure or high pressure, and installations have been made in a number of plants. The records obtained have proven of value to the operators and to the plant superintendent as a means of controlling the operation of an important part of the process.

Sulphite Pulp Digester Control

The most important production or processing unit in a sulphite mill is undoubtedly the digester, and our remarks on this unit will be of greater length and in more detail than the other applications suggested in this paper.

Engineers' and Chemists' Contributions

Nearly seventy years have passed since Tilghmann took out his first patent covering "The process of treating vegetable substance which contains fibers with solutions of sulphuric acid, etc., etc." Other chemists and engineers, including Ekman, Ritter and Mitscherlich, and others, have since made valuable contributions to the theory and practice of the process. Even in this day of rapidly expanding sulphate pulp production, the sulphite process remains one of the most important methods of pulp production in this country and in Canada.

During the last thirty years much progress has been made along the lines of accurate and scientific knowledge of the process, and in applying this knowledge to the design and operation of the plants and production units. The wood is prepared more carefully, the chips are cut more evenly as to length, and refined and screened more carefully. The acid plant, under control of the chemist, produces acids much more uniform in total sulphur dioxide. Indicating and recording gages are used for checking the pressure and temperature of the stock at definite points in the digester and at definite periods of time during the cooking cycle. All of these are done as an aid to the operators in their efforts to produce a more uniform product under approximately the same operating conditions.

But, notwithstanding these improvements in technique, organization and equipment, the most important production unit in a sulphite pulp mill is in most cases controlled to a large extent by the human element.

Pressure and Temperature Control

Human element: While experience has and does develop great efficiency and skill in the men responsible, the fact remains that the results of the cooking cycle are subject to the personal judgment of three or more men each twenty-four hours, and regardless of the degree of skill obtained, of their training, of the supervision under which they operate, or the efficiency and conditions of the mechanical equipment used, it is rather too much to expect that three or more operators can so coordinate their efforts that each cooking cycle will be exactly alike and the same quality and character of pulp produced.

We have two important variables, pressure and temperature, each having a definite and direct bearing on the quality of the pulp produced, and both controlled by the varying judgment of one or more men. The instrument manufacturer has felt that this process could be, at least, partially controlled by automatic means, and our company made it one of the first items on its development program because of its importance in the operation of a major production unit.

Technical Control

Study of cooking: Several years ago, we started a study of the sulphite cooking conditions and operations, not with any intention of establishing a definite schedule of temperature or pressure to be followed in the production of sulphite pulp of desired characteristics, not along the line of theory or technical control, but along the line of physical and mechanical control of actual forces to a schedule of pressure, temperature and time. This schedule should be laid out by the technical control department of the sulphite mills and based on their experience with the quality of the raw material used and the nature of the pulp to be produced.

Control method: A system of control equipment for use with direct-heated sulphite pulp digesters was developed and installed in the plant of a well known specialty company. This control is automatic for over 90 per cent of the cooking cycle.

Automatic control: It automatically brings the pressure up to the maximum point in just the predetermined period of time; it maintains it at this point for the actual time desired, and reduces it to a lower point for blowing. It maintains the low temperature so essential during the penetration period of the early part of the cook and in this way eliminates any possibility of burned or blackened chips caused by high temperatures before the chips are thoroughly saturated with liquor.

The temperature is brought up to the desired maximum at the scheduled rate for any character of stock, and maintains it at the maximum temperature during the remainder of the cook. In other words, this system of control, designed especially for this particular method of cooking, simple in design and reliable in operation, eliminates to a great extent the human element during two of the most critical periods in the cooking cycle, the penetration period and the rise and hold period.

Affect on Strainers and Blowing Clean

Close control of these two variables reduces to a great extent the usual trouble with relief strainers plugging and with digesters not blowing clean. The original installation has given excellent satisfaction and service. An executive of the plant writes: "We have had no trouble whatever with strainers plugging or with digesters not blowing clean. It is my opinion that this system of control practically eliminates the human element and gives more uniform results than any method of control of which I know."

He states further: "The men cooperate with the system because it lessens their work and takes much of the responsibility from their shoulders."

These expressions would indicate that automatic control has eliminated to a great extent two of the most common sources of trouble encountered in the operation of a sulphite pulp digester.

Chemipulp Process Controls

The second stage in our development of control for sulphite pulp digesters was a system designed to be used on digesters equipped with the Chemipulp Process method of cooking. The first installation, made in a six-digester pulp mill producing a fine grade of sulphite pulp for specialty paper, was very simple in principle and so satisfactory that the other five digesters were equipped in a comparatively short time after the preliminary trial was finished on the first one.

In this case, as the liquor is preheated and supplied to the digester at a temperature considerably higher than in plants not using this method of cooking, the question of temperature control was not quite as important and the control was based on the principle of pressure only. By this I mean that the controls were designed to maintain a fixed pressure in the steam supply to each digester, and a second control unit used for maintaining the relief pressure from each digester as desired. It is possible to vary the relief line pressure to a definite schedule by means of a time pressure schedule control, or it can be adjusted to any desired point by a simpler type of control with manual adjustment.

In answer to our inquiry regarding the benefits derived through the use of this equipment, they write: "Briefly, the advantage has been in a much more uniform digester operation with the control as compared to previous hand control cooking. The automatic controls remove the personal element in this operation to a large extent. Our cooking time is more uniform and the temperature curves which we are able to obtain are almost exact duplicates of each other. The bleach demand of the pulp which we are producing does not show nearly the variations with the control that it has in the past."

Please note the reference to the uniform temperature curves. Evidently the fact that preheated cooking liquors are used eliminates to some extent the importance of temperature control if a properly designed pressure control system is used.

Time, Temperature and Pressure

You may ask: How does a control system based on a definite schedule of time, temperature and pressure, or time and pressure, take care of normal variations in strength of the cooking liquor, the percentage of saturation in the steam, and the percentage of moisture in the chips? We might suggest that the wood supply in most plants, coming from storage piles of considerable cordage, varies little in moisture content; and the variation in steam saturation in the average plant is not very great; and that under present technical control the strength of the liquor is maintained within close limits. We feel that a great majority of cooking operations are carried out with the idea of controlling the process to a schedule that is based on a fair average of liquor, steam and wood.

The question of sulphite pulp production is of far too great importance and much too wide in scope to be covered by a short paper, and it is not my intention to attempt even in a small way any description of the process or the great possibilities that can be derived through some universal method of standardizing the cooking operation.

It is our purpose to bring out the fact that a most complex process, predicated on an intricate chemical reaction now under control of the human element, has been and can be controlled in a satisfactory manner by the use of well designed instruments. While this automatic control system will not adjust itself to every small variation in the raw materials, it will, however, do the same thing in the same way every time, a performance that is practically impossible in a process depending entirely on the human element.

Wet Press Operation

A number of sulphite pulp mills, producing high grade bleached sulphite pulp for the open market, use high duty wet presses for partially drying the pulp to be shipped in laps or sheets. A well known manufacturer of heavy duty presses recommends nip pressures as high as 1000 to 2000 pounds per inch working width, and their guarantee on capacity and percentage of dryness is based on the nip pressures being carried as recommended for different stocks.

In some plants the stock is passed through these heavy duty presses and then on to drying machines where the moisture content is reduced to an air-dried value, but in either case the object of the press is to remove the maximum amount of water in the most economical way, and an instrument enables the operator to maintain the desired nip pressures and to check the operation throughout the entire period of operation.

As the cost of removing water at the press section is but one-tenth as high as evaporating it from the sheet on the driers, it is obvious that a record of nip pressures is necessary in order to justify the large investment involved and obtain the highest efficiency at the presses.

Manual Control vs. Automatic Control

Stock, in order to be well processed in the beaters and jordans, and in order that a good sheet can be formed and dried on the machine, must first of all be good stock when it leaves the pulp mill. The task of sensing variations in temperature and pressure and correcting the process variables and adjustments to a point within close limits cannot be accomplished except by the use of precision type instruments properly designed for each application.

We have not referred to all the points in the process where instruments could be used, but only to several critical ones in the stock flow line where control is important and necessary to efficient plant operation. The primary object of every plant executive in the pulp and paper industry is to produce a high quality product at the lowest possible cost consistent with safe and practical plant operation, and all of his efforts are necessarily devoted to devising ways and means by which this may be accomplished.

The instrument manufacturer's part in the industrial picture is to work with the various industries in the development of practical and efficient equipment. This equipment when properly applied and intelligently cared for will furnish the executive with more reliable and accurate tools with which to control the many unit operations in the plant, and with this close control, produce a finished material in quantities and of a quality that will assure a fair margin of profit on the plant investment.

The Development of Flexible Doctors*

By F. W. Lodding[1]

In tracing the development of flexible doctors for use on the paper machine we must go back to the year 1912. About that time John Frossard obtained one of the first U. S. flexible doctor patents. Mr. Frossard was schooled in the mechanical departments of paper mills and thus obtained an intimate knowledge of the doctor troubles then existing on the paper machine. Being a pioneer in his line, he of necessity limited himself to a narrow field, and most of his doctors were made for calenders or supercalenders. Mr. Frossard continued to develop his flexible doctors, and in 1925 patents were granted to him in this country on an improved doctor mechanism. On approximately the same date, patents were also granted to F. W. Vickery of London, England, on the same subject. There was some difference in the fundamental conception of their ideas, but both of these patents belonged strictly to the category of flexible doctors in its most restricted sense. In the five years following, doctor development was in the direction of improving the doctor blade material or the method of fastening the doctor blade so that its utmost flexibility could be utilized.

The Floating Blade

In June, 1929, the writer became convinced that the existing modes of holding flexible doctor blades did not permit the fullest benefit of that flexibility to be obtained. In order that a flexible blade might be free to absolutely conform itself to any irregularities of roll surface. He believed that both front and rear edges of the blade should be unconfined. In all existing doctors, the blade was clamped rigidly at its rear edge, thus limiting severely the ability of the blade to adjust itself to the roll surface. He developed a method of holding a flexible blade in such a manner that both edges were substantially unconfined and the resulting action of the blade might be well defined as "floating." The writer applied for a patent in 1929 and it was granted in 1932.

Today we believe that every paper maker, and almost anyone associated with paper mills, has at one time or another discussed the relative merits of this floating action of a doctor blade, but I may state that the idea was so new in 1929 that Mr. Lodding had even to set a new usage for a word in the English language describing this new action of a doctor blade. The word "floating" is, of course, not a new word, but it had never before been used in connection with doctor blades. He even went as far as to coin the phrase "free floatability." This was all done as early as 1929.

Development of Doctor Blade Materials

Bakelite

The development of doctor blade material has been rapid. We believe that most of you are familiar with the use of bakelite doctor blades. A very interesting incident occurred the other day when the Formica Insulation Company of Cincinnati, Ohio, called a meeting of all their salesmen. The chairman of the meeting had gone through their old files and found that Lodding was the first person to use a flexible bakelite doctor blade about 3/32 in. thick by 2½ in. wide by about 120 in. long. Some of the other bakelite manufacturers may take issue with us on this point, but we have in our files letters from practically all of them stating that the greatest length they could produce was either 72 or 84 in. So, to the Formica Insulation Company goes the honor of making the first flexible bakelite doctor blade ever used on a paper machine.

Plated

We remember the first flexible steel blades used on press doctors. In 1929, when stainless steel was unknown for this purpose we used to furnish regular tempered carbon steel. This, of course, would rust at the edge making it necessary to change doctor blades at least once a week, if not oftener. We then hit upon the idea of cadmium plating the doctor blades, but this did not work, at the plating would quickly peel off.

Stainless Steel

Great advances, however, have been made in the production of stainless steel as a doctor blade material. In the manufacture of our blades we employ several types, some of which is produced here and some being imported from Sweden. The first stainless steel doctor blade was used by the writer. It was made .035 in. thick by 2½ in. wide and was produced by the Carpenter Steel Company of Reading, Pennsylvania. This was in the latter part of 1929.

Just to show you what work has been done during the last ten years in the development of stainless steel for doctor blade material let us tell you one of our early experiences. You can imagine our surprise when we opened up the first bundle of stainless steel for doctor blades and found it so hard that it had cracked in several places. We tried to use this steel for doctor blade purposes, but found it was so brittle that it had characteristics almost like glass. Needless to say, we nearly had some very serious accidenst because of this property. The hardness of the material was soon corrected by the metallurgists of the steel mills and from then on the development proceeded along regular lines. As each of these doctor blades materials just described plays an important role in doctor design, we thought you might be interested in a little historical record.

Classifications of Doctors

The principal modes of doctor construction can be divided in three main headings:

Solid doctors.

Flexible doctors, securely fastened to supporting members.

* Presented at the Annual Meeting of the American Pulp and Paper Mills Superintendents Association, Washington, D. C., June 13-15, 1939.
[1] Lodding Engineering Corporation, Worcester, Mass.

Floating flexible doctors.

Solid Doctors

Solid doctors are characterized by thick doctor blades of varying compositions fastened to angle iron or pipe construction supports. Such doctors were common several years ago, but are being rapidly replaced. On calenders it was common practice to use a doctor blade ⅛ in. thick made of soft steel. For some reason, everyone seemed to think that the softer the steel the less chance of scoring. In order to fit these steel doctor blades on the calenders it was necessary to pein the doctor blades. Many an old timer must well remember the expert "peiners," once employed in every paper mill. On the presses, the conditions were much the same. Because the blade, a thick strip of bronze or hard rubber, rarely cleaned the roll satisfactorily, it was common practice to use a felt wipe or a piece of felt wrapped around the lip of the doctor blade. This arrangement, of course, became filled up with clay and other clogging material in very short order.

Flexible Doctors

With the advent of flexible doctor blades, many of the old difficulties were overcome. The original flexible doctors, however, never were completely satisfactory on the wet end. They performed fairly well on the driers, but on the calenders they were indeed a great improvement. There were many disadvantages attached to what we must call the original flexible type doctors. Many devices were made to try keep the thin blades from buckling under temperature changes. The frequent changes of doctor blades were usually attended by much physical effort and mechanical difficulty. Nevertheless, they demonstrated a step in the right direction and were a marked improvement over the old doctors with thick blades.

The Lodding floating blade principle represents a great step of development over the original flexible type doctor. The latter involved a flexible blade securely clamped at its rear edge onto a conventional doctor back. Obviously, such a manner of holding a flexible strip of material seriously limits its flexibility and its ability to adjust itself to temperature changes and irregularities of surface. The Lodding floating principle applies the doctor blade to the roll without clamping or securely fastening any portion of the blade. It is perfectly free to accommodate itself to any effects of expansion and contraction or irregularities of surface which may be present on any paper machine roll. It is apparent that a doctor blade held so that it is absolutely free to flex in every direction will fit closely against a roll surface with far less pressure per linear inch than is required by any of the preceeding doctor mechanism. It may be worth something as proof of the value of this principle that nearly every machine built in the South is equipped with Lodding wet end doctors. We think that you will all agree that the most difficult part of the machine to doctor is the wet end and in our organization we have always maintained that if we can successfully doctor the wet end the dry end is easy.

Oscillation of Doctors

Space For Oscillating Mechanism

We had often wondered why such pains were taken to oscillate press doctors when none of the other doctors on the paper machine were oscillated. The truth of the matter is that many top press rolls are made of soft materials such as rubber and bronze which would be scored if the doctors were not oscillated. The top press rolls might also do some picking and we believe that the oscillation of the doctors helps to remove the fibers picked up. Looking into the matter more closely, we soon discovered that it was almost impossible to oscillate the doctors on the drier sections and calender stacks because there was not enough room. The conventional mechanisms for oscillating doctors have been comparatively complicated and required more room than was available in most positions on the machine. Several attempts have been made to oscillate calender doctors, particularly for supercalenders, but the equipment has been very expensive and has been in the way of almost everything you can think of. We have in the past few years made mechanical oscillators for drier doctors which have mostly been on single tier driers with plenty of room on the back side. On ordinary drier parts of two or three tier construction, it is practically impossible to install mechanical oscillators.

Theory Of Oscillation

A few years ago, we observed the action between a doctor blade and a rotating surface, both when the doctor blade was stationary and when it was oscillating. We found that under paper mill conditions there would be a tendency even on the dry end, and as far down as the calenders, to build up a film or deposit of fibers between the doctor blade and the roll surface. We found that by oscillating the doctors, a shearing action was set up which established a metal to metal contact between the doctor blade and the roll surface. It is exactly this metal to metal contact that will keep the calender roll, or any other roll, clean.

Search for Best Means of Oscillation

After long search for suitable equipment to oscillate all doctors on a paper machine we found that the best means was pneumatic power, either air pressure or vacuum, both of which are usually available in all paper mills. If neither is to be had, a small unit can be purchased, at a very low cost, big enough to run all the doctors on a paper machine. We looked into hydraulically operated oscillators as well as oscillators operated by oil pressure, but we found that we would get into rather messy conditions, and that air was by all means the superior method of obtaining power.

A connection to the suction leg of the suction couch or suction press provides the power by which an entire set of calender or drier doctors can readily be operated. The piping system is simple in that it consists of only a small copper tube. A needle valve is placed on the tending side for each doctor so that it is possible to vary the number of oscillations as much as from five to fifty per minute.

Designing a Compact Oscillating Mechanism

Our problem in designing suitable pneumatic oscillators reduced itself to the proposition of having a unit which would not take up any more space than that of the ordinary doctor. We use the doctor journals for air cylinders. In other words, the doctor journals became cylinders fastened to the doctor body traveling back and forth between sta-

tionary pistons. This all resulted in an extremely compact working unit actually requiring less space than an ordinary nonoscillating doctor with its complement of pressure applying devices. To obtain a smooth, dependable motion we arranged matters so that the entire doctor rides on ball bearings.

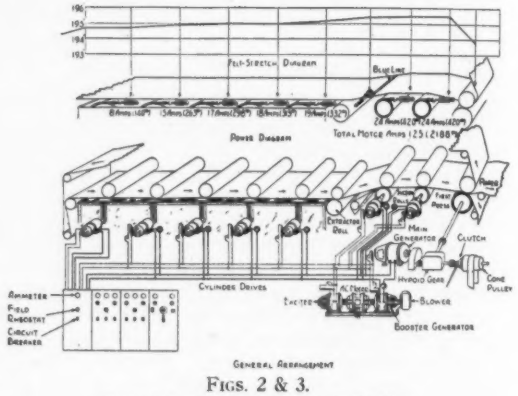
We encountered a major problem in designing a valve mechanism which would relay the air or vacuum from one cylinder to the other. The windshield wiper engineers are the only ones that have done any real development work along these lines, but we soon found out that we could not avail ourselves of their construction due to various technical difficulties. Therefore, we had to develop our own valve mechanism. Before sending this apparatus out on the market we gave it some very severe tests. Some of these mechanisms are still on the testing board and they all have covered the equivalent of several years actual paper mill service. In other words, we did not want to send out anything that was not absolutely foolproof. We have, moreover, designed our apparatus in such a way that should anything go wrong due to an accident, a new valve unit can be replaced in a couple of minutes with the machine running.

Wet End Drives For Board Machines *

By F. M. Roberts[1]

The power required to operate any piece of mechanical equipment which performs useful work is made up of two parts, the part which does the work on the product and the part which overcomes friction. On the wet end drive, the smaller part is that required to do the work on the board, and the larger part is that required to overcome the seal and bearing friction and the other loads of the sections of the machine. The wet end of a board machine can be considered as a series of machines which are operating in sequence, each of which is contributing its share to the production of the finished board.

The cylinders deposit layer after layer of stock on the felt, until the thickness required has been built up with the proper formation. Suction rolls, wringer rolls or primary presses remove water without destroying the formation. Between each of these sections or machines, the felt carries the material, since the board does not have sufficient strength to carry over by itself. Part of the process is to produce the proper condition of the board between sections so that each successive cylinder adds its share to produce the proper thickness with the best formation. Water must be removed as the sheet goes from cylinder to cylinder and after having left the last cylinder, more water must be removed as the board proceeds with the felt to the final press section. Each pair of rolls through which the felt and the sheet pass have friction in their bearings and are part of the total load of the wet end of the machine.



FIGS. 2 & 3.
General Arrangement of Wet End Drive

* Presented at the Annual Convention of the American Pulp and Paper Mill Superintendents Association, Wardman Park Hotel, Washington, D. C., June 13-15, 1939.

[1] Industrial Department, General Electric Co., Schenectady, New York.

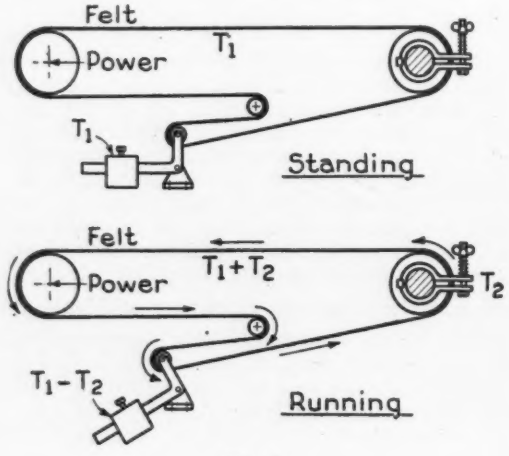


FIG. 1.
The Two Kinds of Felt Tension.

Analysis of Drive Principles

Without an auxiliary drive, the power required to haul the load of the wet end must be supplied by the felt. Although this arrangement has been used generally throughout the industry, the modern trend towards higher speeds and more exacting standards with the present day emphasis on economy in operation has suggested the need for an analysis of the old system of drive to determine how it can be improved. A number of fundamental principles may be enumerated in order to clearly understand the problem:

The cost of removing water at the driers is from 8 to 14 times greater than the cost of removing the same amount of water on the wet end.

The felt designer finds that the ability of the felt to remove water goes down as the mechanical strength goes up.

The power to overcome the friction load in many sections of the wet end, if supplied by the felt, must be transmitted through the sheet.

The condition of the sheet can only be judged completely after the sheet has gone over the wet end. There is no way to study the operation of the wet end sections during production, except by taking felt stretch curves continuously. This lack of information during operation tends towards loss of uniformity in the product and to short felt life.

The felt must stretch and contract once for each round trip; obviously, the greater the stretch per revolution, the shorter the felt life. The more the felt is pulled, the more the weave closes up and the harder it is to keep the felt clean and to get the water out of the sheet.

It appears that the ideal wet end would be one whose sections have no friction load whatsoever. Actually, such a condition is impossible, as well as undesirable. There must be some tension in the felt in order that it may pick up and hold the sheet successfully and this tension should increase uniformly from the first cylinder mold to the main press. However, it is possible to improve the operation and approach the ideal condition of minimum felt tension by neutralizing part of the friction load of the sections.

Sectional Drives

This improvement is accomplished by attaching to each section a power unit to supply the power for that part of the friction load which is not needed to furnish the felt tension. These motor units supplement the power supplied to the sections by the felt and are helper units only. The power which they supply is controlled and is proportional at all times to the rating of the units.

Felt Tension

Possibly a little clearer understanding of felt tension is desirable. The tension in a wet end felt may be divided into two parts, Fig. 1, the initial tension put in at standstill by the felt stretch, and the dynamic tension required to overcome the friction and work load of the component parts of the wet end. There is no true method of measuring the total felt tension during operation. The power input to the helper motors is not a measure of tension but is on the contrary an indication of additional felt pull which would be required were it not for the helper motors. The only true way to find out what is happening at any instant is by taking readings of felt length and plotting a felt stretch curve, Fig. 2 and 3.

Once a typical felt stretch curve for satisfactory operation with helper motors has been plotted and the relationship between motor power input and satisfactory running tension is established, then this condition will be maintained constant by the helper motor drive and the initial felt tension may be adjusted by the felt stretch.

In designing the helper motors for such a drive, care must be exercised to make certain that the motors will cooperate electrically to share the motor load with each other, and to share the total load with the felt. The motors may be of widely different ratings; a specific machine may require 5 hp. cylinder mold motors, 10 hp. primary press motors and a 50 hp. main press motor.

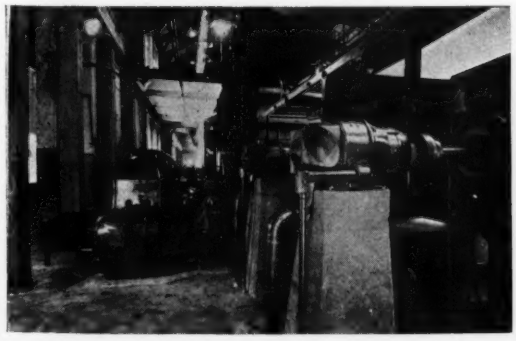


Fig. 5.
Auxiliary Wet End Drive Showing Generator Driven from Inside Main Press Clutch.

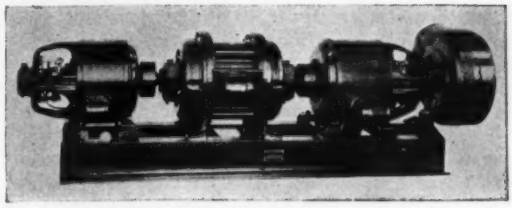


Fig. 4.
Induction Motor Driven—Exciter—Booster—Blower Set for Wet End Drive.

As the grades and weights of board are changed, the speed of the machine will be altered. As the speed of the machine is adjusted, each wet end helper motor must respond automatically so as to maintain constant felt tension at all times and avoid the necessity for adjustment by the machine tender.

Auxiliary Drive For Wet End

Fig. 3 illustrates how such a helper drive is built to accomplish these results.

The generator which supplies the power for all the wet end motors is driven from output side of the first press clutch. The instant the clutch starts to turn the felt, the generator begins to rotate, thus generating voltage in the supply circuit to the helper motors. Each motor has armature resistance and unless there is enough voltage in the circuit to overcome this resistance and to circulate load current, the motors will not carry their share of the load. To make sure that they do actually share the load and accelerate uniformly at all times, a small "booster generator," Fig. 4, driven separately by a constant speed induction motor is included, whose duty it is to add to the motor circuit a voltage to overcome the resistance drop of the motor armatures and circulate load current. This voltage is adjustable so that the relationship between motor load and felt load can be adjusted.

Controls

In order that the load which each motor carries may be selected separately, a rheostat is supplied in each motor shunt field circuit which permits changing the motor field strength to cause it to take a greater or lesser share of the total wet end load. In like manner by increasing or decreasing the booster generator voltage, the load of which the felt is relieved by all the motors, as a group, may be adjusted.

The operation of such a system may be clearly

Fig. 6.
Auxiliary Drives on Front Side of Cylinder Molds.

understood, by referring to the typical felt stretch curves with and without the auxiliary drive. It should be noted that the maximum felt stretch without the auxiliary drive is 5 times as great as when the individual drives are used.

There is a special application of the principle of this drive which is of general interest. It may be that a wet end section, driven wholly by the power input to the felt, can be made more efficient by the addition of a suction roll. The power for such a roll can be furnished by using this same form of auxiliary drive, Fig. 5, 6 and 7, with only one motor for the new roll to relieve the felt of the additional load which would be imposed otherwise.

Such drives as these use gear motors which are mounted immediately beside the wet end sections, these are totally enclosed and externally ventilated, built-in units with concentric shafts to minimize the mounting space required. External ventilation is provided as the motors must operate over a wide speed range with little self ventilation at low speeds and in very damp places. There is no better insurance for the safety of electrical motors than clean dry air under pressure inside the motors. It is imperative that a reliable supply of ventilating air be available whenever the motors are receiving power from the generator. To make certain that such air supply is provided, the blower is made part of the small induction motor driven exciter set which includes the booster generator already described.

Control Panels

In order that the full advantage of the individual motor drive may be available, meters are furnished which indicate the load each motor is carrying. By marking these meters the operator can maintain a permanent felt stretch relationship which can be instantly inspected at any moment. The motor load adjusting rheostats are mounted on the control panel, Fig. 8 and 9, beside the meters. Provision is made on this control panel for disconnecting any motor electrically, from the line. These controls which the operators use are mounted on steel panels of "dead front" construction so that there is no possibility of electrical shock, even though the operators have wet hands and feet.

Increased Felt Life

There are a great many modifications and variations of these auxiliary drives from the single motor driving the suction roll to the completely electrified wet end. Experience has shown that these drives do accomplish the objects which are desired. Felts can be used which are designed for the purpose of forming the sheet and removing water from it. The designer is less handicapped by the necessity of obtaining the high tensile strength necessary to enable the felt to act as a traction belt. More water can be removed on the wet end, making it possible to operate the machine at higher speeds with less steam consumption on the driers. The stresses to which the tender sheet is subjected, can be reduced and controlled. A better and more uniform product is possible.

A recent report from a mill operating three wet end drives of this sort shows a 75 per cent increase in the life of the bottom felt, a great reduction in the cost of top felts, a sheet which will print more readily and have a better count. A much greater flexibility in the operation of the machine was also shown.

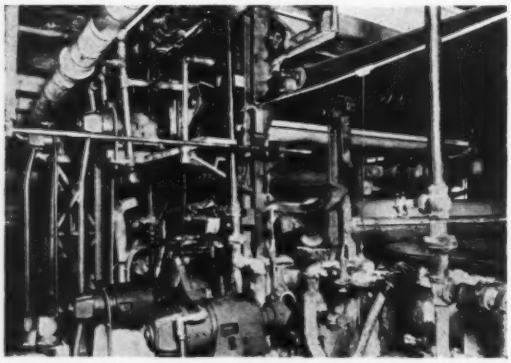


Fig. 7.
Auxiliary Drives on Suction Drum Roll Primary Presses and Cylinder Molds.

Fig. 9.
Steel "Dead Front" Control Panel for Separately Driven Suction Drum Roll.

Fig. 8.
Steel "Dead Front" Control Panel for Complete Wet End Drive.

Tomorrow's Stock Preparation—Today*

By Joe Baxter, Jr.[1]

The first sheet of paper that was ever made, must have astonished the Chinese T'sai Lun, by the amount of work required to reduce the fishnets to a finished sheet. Although not made from fishnets, a glance at your own costs on stock preparation probably leaves you with much the same feeling. It is only logical then, that you should ask: How can I produce the best stock at the lowest cost?

T'sai Lun was confronted with four major problems, with which everyone of you will be faced tomorrow: How to *pulp* your stock; how to *refine* it; how to *agitate* it; and, how to *screen* it. Those are the four major problems to be solved; the first three of which, if solved properly, practically eliminate the fourth.

The old saying "there's nothing new under the sun" may, or may not be true, but there are better ways of doing things. For instance, there is a better way of pulping and refining than possible with the beaters, and there is a better way of agitating stock than by paddle agitators.

In 1937, G. N. Collins compiled a list of refining equipment in his paper entitled, "Suggested evaluation procedure for comparing hydrators and refiners." In this paper, there is a list of forty-five different makes and designs of pulpers and refiners, of which 17 were modifications of the old Hollander type beater, combining the functions of pulping and refining; 3 were of the Lannoye pulper type; one was purely a shredder; 5 were of either the hammer or rod mill type; 2 were of the impinging type, where a stream of pulped stock is directed, at high velocity, against a specially designed plate; 7 were of the opposed flat disc or plate type; and 6 were conical refiners similar in construction to jordans. A glance at this list and one readily understands why you paper makers hesitate to place your finger on any one item and say, that is it.

It is not my purpose to delve into the various details of construction that identify these units, but rather to appraise their principle of operation, not with the idea of presenting any brand new theory, but rather to ascertain just how far we really are advanced on the road to *better stock preparation.*

Pulping Fundamentals

Since we consider our raw materials in more or less sheet form, that has been partially processed, such as sulphite, groundwood and pulp laps, it follows that the ideal pulper is that piece of equipment that will separate each individual fiber from the adjacent fibers without in any way changing the characteristics of these fibers. It is impossible to achieve 100 per cent separation because the natural hydration will take place to a limited degree, but as far as fraying or cutting of fibers is concerned, it can be achieved.

Natural absorption of water takes place at two different rates. The absorption from the edge of the pulp lap is more rapid than from the surface, and in order to get perfect separation, water must penetrate the entire mass. Obviously to increase the rate of pulping the use of mechanical means must be resorted to, and in so doing, remember, first we wish to increase our edgewise absorption and second, to completely slush the resulting small bundles of water softened pulp. This mechanical action must be such, that the pulp lap is torn into relatively small dry pieces of pulp, and after taking up water, can be again subjected to the thrashing action of the pulper to complete slushing. The efficiency of the pulping mechanism bears a direct relation to the ability to concentrate impact.

We, therefore, have three expedients by which pulping rate can be increased. Concentration of impact, increasing edgewise absorption, and the use of hot water.

There are available today four main types of pulpers. In discussing these types, reference to names is simply to classify the type. Any new piece of equipment being offered to the trade is naturally predicated on prior art, and thus, in a sense, it is obligated to the pioneers in this field.

Classes of Pulpers

The four types are the Hollander beater type, the Lannoye pulper type, the Shredder type, the Miami High Density Pulper (formerly Tugboat Annie).

The Beater as a Pulper

We are all familiar with the limitations of the Hollander beater type. However, the mere fact that it has survived is without doubt, due to the fact, that if given time enough almost any kind of paper could be made. Any piece of equipment designed to do two things simultaneously is apt to do neither at peak efficiency, hence, the beater as a pulper is slow because the full width of the bar strikes the sheet at relatively low speed (about 1500 ft. per min.) and the impact is spread over a large area. Instead of striking through the sheet, the roll will jump, allowing the sheet to pass under until it has become sufficiently saturated to disintegrate. It is generally accepted that the rubbing action of fiber upon fiber is conducive to better pulping especially at higher densities. In the beater, due to low consistencies, this beneficial effect can not be fully utilized.

The question of better circulation in a beater has caused many grey hairs. The use of a pole to push pulp laps, broke, etc. under the roll, contributes in a large measure to the variation in the furnish due to dropping a beater before it is ready, simply to keep up the chest level. This practice involves a loss from two sources, labor and power. With nothing going under the roll, no work is being done. It has been found that the power distribution in the beater is about 80 per cent for circulation only, and 20 per cent for actual work on the stock; either pulping or with roll down hard on bed plate.

Washdown time, in a sense, is lost time, because to thoroughly wash down a beater, after a color change, you may be using power for as long as 30 minutes to turn the beater roll, with no useful work done. Con-

* Presented at the Annual Meeting of the American Pulp and Paper Mills Superintendents Association, Washington, D. C., June 13-15, 1939.

[1] Engineer, Shartle Brothers Machine Company, Middletown, Ohio.

sidering the water used, power lost, danger of contamination of one color with another, and labor involved, washdown time on a beater is highly important and reduction of this time means lower production cost.

Lifting paper is tiresome work, and when you stop to consider that nearly every beater is so located that the furnish must be lifted over the side, it is obvious that any reduction in the amount of labor so used, will result in fewer men to do the same work and at the same time maintain a much more uniform flow of slush pulp to the chest.

Lannoye type pulper

The Lannoye type of pulper has one redeeming feature in its ability to handle consistencies up to 30 per cent, but of course this high consistency is only desirable when bleaching or chemical treatment is required in as concentrated a form as possible. It involves conveyors rather than pumps for subsequent moving of material. Pulp laps or baled papers must be fairly well separated, or fluffed, before being fed into it. The action is similar to that of chewing since there are stationary teeth past which revolving teeth pass, thus macerating the paper without metal to metal contact. There is, however, a decided tendency to discharge small flakes of paper rolled into tightly wound balls, the center of which is only partially moist. These little balls are conducive to socalled ink-balls in the process of deinking and although this type of pulper has been used extensively for this purpose, more chemicals are required and lower quality results due to this one defect. For large production, this type of pulper does not have sufficient capacity and works a hardship on the subsequent refining equipment such as jordans, etc. The installation is such that an attendant must feed the raw materials to it at a constant rate to secure uniform results.

Shredder type Pulper

In view of our previous definition of a pulper, the shredder type does not fully meet the conditions because the first step only is completed, that is, the dry stock is reduced to relatively small areas and then soaked. No further treatment is given, hence the work of debundling the fibers falls on the subsequent equipment.

It therefore reduces the pulp to a *flowable* condition only, but not *pulped* in the full sense of the word.

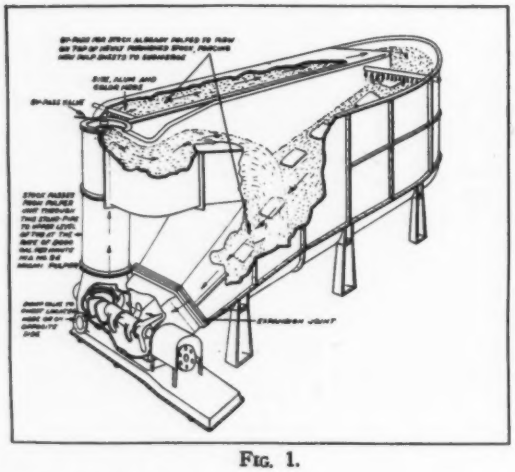


Fig. 1.

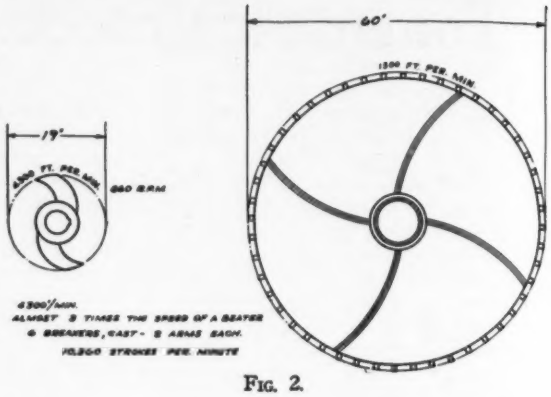


Fig. 2.

It is, however, a *continuous method* of securing the type of shredded material it produces.

Miami High Density Pulper

Let us review for a moment our definition of a pulper. It is that piece of equipment that will separate each individual fiber from its adjacent fiber without changing that fiber's characteristics.

To accomplish this we found that concentration of impact was of prime importance.

In the Miami high density pulper, a new approach was made to the question, and the results have justified the original design, which has been changed only slightly during the past few years, in which time more than one hundred installations have been made. These installations cover the pulping of straw, kraft, sulphite, groundwood, shavings, box shop clippings, hard ledgers, and bottle cap. Even those papers that were considered extremely difficult to pulp have been handled with comparative ease.

A brief description will enable you to see why this type of pulper is efficient. A single shaft, Fig. 1 having 12 breaker arms and an impeller mounted on it, is rotated within a circular chamber having a side opening at the inlet and an end opening at the discharge. Connecting from the discharge is a midfeather type tub, having a steep sloping bottom, that slopes toward and connects to the inlet connection to the pulping chamber. The connection from the discharge to the tub is through a large vertical pipe terminating in a rotary type valve, that permits a stream of pulped stock to be bypassed to the inlet, to act as a submerging stream on incoming stock.

The shaft is driven at 860 r.p.m. which gives a top speed, Fig. 2 of 4300 ft. per min. on the breaker arms. This is almost three times as fast as the impact velocity of a beater roll.

Each breaker and propeller arm is so constructed that the impact is centered over a linear distance of approximately 2 in. and when you consider, that the second stroke is made just 6/1000 of a second later, you can visualize the terrific action possible on a sheet of pulp. To illustrate the action of each breaker arm take a sheet of paper, Fig. 3 and with the thumb extending over the edge about 1 in., grip the sheet and tear downward, and when torn in a distance of 1 in., change pressure on thumb to tear to the right. Repeat this action progressing to the left across the sheet and you reproduce what happens for each revolution of the pulper shaft. Each small piece, thus liberated, is free to take up water around the edges and under pressure as it passes on through

the pulper unit, up the discharge pipe and into the tub. Here the pressure is released, and the stock has a period of rest until it again reaches the suction chamber. On the second pass the small particle is whipped through the surrounding stock with the edges fraying off similar to a flag flying in the breeze. Three or four such passes and the flake is practically disintegrated. Imagine if you will, a small water soaked piece of your own pulp being swished through a pulp suspension of 6 to 8 per cent consistency at 4300 ft. per min. This accounts for the ability to dump a Miami pulper shortly after the last paper is charged to it. By thoroughly separating the fibers, subsequent refining can be done to the required degree.

The question will naturally enter your mind as to whether it will plug. It will, but the remedy is simple. The motor is connected with a reversing switch, and when used, the unit literally disgorges the lodged material. Only a moment is required to again start the motor, and the flow is again resumed. Clogging occurs usually from improper feeding and the men soon learn how to correct this fault.

The rate at which stock can be fed will vary, depending on its hardness, but on stocks similar to sulphite 400 lb. per min. is regularly obtained with one man feeding; on harder stocks such as ledger and kraft 300 lb. per min. can be handled. It is not necessary to fluff the stock to any great extent. Sulphite and soda laps, 2 in. thick pass all right, and kraft sheets 1 in. thick cause no trouble. Shavings, box clippings, and fluffy stock are readily handled by submerging with the bypass stream.

Although it is more economical to handle larger batches, the Miami pulper will handle from 500 lb. to 5 tons with equal facility and thoroughness. The actual pulping takes place at a fixed rate, and the time can be closely estimated, making it possible to schedule operations more easily than with beaters.

A typical cycle on a 3000 lb. batch of sulphite and soda requires about 25 minutes, broken down as follows: adding water to tub, 2 minutes; charging at rate of 300 to 400 lb. per min. takes 10 minutes; 3 minutes allowed for additional pulping; 5 minutes for dumping; 3 minutes for washdown. During this time our power will reach momentary peaks of 120 h.p. dropping to 90 then to 70 h.p. as soon as the last sheets have made one pass.

The washdown requires between 300 and 400 gallons of water, according to users, so dilution of stock is not affected, since this can be allowed for in the make up.

The mixing of colors, starch, alum, etc., is effected in 2 passes through the pulper. This is made possible by the bypass which intermixes the stock thoroughly, and the whipping action of the breaker arms. About one minute is required for a complete turnover.

We have not pulped rags commercially with it, although tests in a small unit caused astonishment in that it did not plug up.

There is a small pulper available for tests in your own mills on your own stocks. It uses 7½ h.p. and is scaled to dimensions and impact to correspond with results of the large pulper.

What is a Refiner?

The use of the word "refiner" is, in a sense, ambiguous, because "to refine" means to make smaller or purify, when actually what we want to do is to impart new characteristics to the fibers by treating them mechanically.

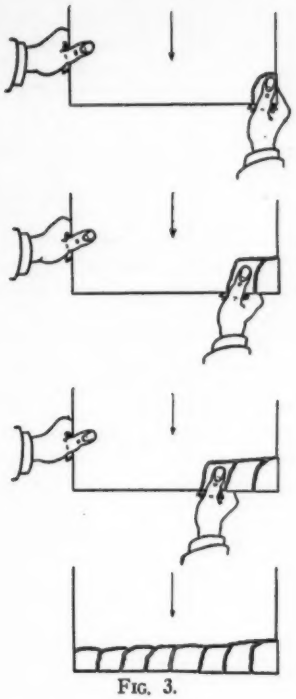


FIG. 3.

John A. Wiener, in 1936, said, "A refiner is a machine handling stock much earlier in the pulp process than a jordan." In view of the recent importance placed on refiners, may we suggest that the term "refiner" designates that piece of equipment by which the characteristics of the fibers may be modified to suit the requirements, as to freeness mullen, tear and tensile tests.

Back as far as 1858 papermakers realized that as a refiner, the beater was slow and inefficient for imparting the desired characteristics to the fibers. It was the inability to quickly control these characteristics that prompted Joseph Jordan to patent his "continuous beater" which today bears his name and is known as a jordan. The early jordans were all alike, filled with either ⅛ or 3/16 in. bars and operated at approximately 300 r.p.m. regardless of the paper being made. This made an excellent cutting arrangement and was used for just that, to shorten the fibers and control formation.

It was perhaps fifty years later with the advent of the kraft industry in this country that the jordan really came into its own and through the development of proper fillings, the determining of speed, relation of pressure, tandem arrangements, etc., came the refiner as we know it today. Also came the possibility of *cycling* the stock so as to reduce the amount of equipment required for a given tonnage.

Classes of Refiners

There are five types of refiners available, considered in view of our revised definition:

Roll and bedplate type
Hammer or rod mill type
Impact type
Plate or disc type
Conical plug and shell

Regardless of the types available, the fact remains that over a period of years, the refiners that have proven successful are those having bar contacts and are capable of being adjusted until the bars just pass.

Roll and Bedplate

The roll and bedplate type has more modifications than all the others put together. As its inefficiency became apparent, more bars were added to the bedplate until today beaters are being offered that have the roll practically surrounded by bedplates. Obviously, this type of arrangement causes difficulty in adjusting the roll or bedplates to obtain proper clearance. The power distribution has not changed materially because the circulation of stock is still done with a paddle wheel, having a relatively long torque arm, which is the radius of the roll.

After all the ideal refiner, regardless of who makes it, is that piece of equipment capable of imparting desired characteristics to the fibers after they are pulped, with the ability to chart and duplicate this treatment in the future, with only simple adjustments necessary. Of secondary importance, but highly desirable, is relatively low investment, low power consumption and space saving.

A study of the refiners now available brings out the importance of centrifugal force, number of bar passes, angularity of shear, length of dwell within refining chamber, temperature, bar arrangement and clearance.

Referring to the beater for a moment, the centrifugal force is bound to be low or the stock would never pocket. The number of bar passes per fiber is low because the stock passes the bars at right angles, thus taking the shortest path, thereby cutting down the length of dwell. The angularity of shear is limited due to elbow shape of the bedplate. The use of a corrugated filling was developed to offset this defect. The temperature in the beater is gradually increased and since temperature has a pronounced effect on hydration, we can understand why it takes so long to cold beat the stock.

Hammermill or Rod Mill

The hammermill or rod mill type of refiner, will make fish eyes at a low consistency and if the consistency is increased to eliminate the rod to rod contact, we secure only a squashing action of fiber upon fiber. Of course, this is beneficial, but slow, involving a number of units for relatively low capacities. The upkeep, noise and possibility of discoloration are detriments.

Impact

The impact type of refining attempts to use the same principle as that secured from centrifugal force but uses excessive power in forcing stock through nozzles at sufficient velocity to approximate the slushing secured in, say a conical refiner, and we know from actual experience that slushing alone is only one of the factors that go to make up acceptable refining —bar passes are essential.

Plate or Disc

This brings us up to the plate or disc refiner or attrition mill. Here we have two opposed discs rotating in opposite directions, fed through the center of one plate. This arrangement gives a large number of bar edge passes, but does not have a sufficient turbulence chamber between those edges. The discharge cannot be throttled or the plates will rapidly fill up and scorch due to the high speed. The full benefit of the centrifugal force can not be utilized since the stock thrown off at the rim is cushioned in stock adhering to the walls of the casing. It does however cause the stock to travel in a somewhat spiral path, thereby increasing the bar passes per fiber. Its greatest defect is the adjustment of the plates, because it is mechanically difficult to adjust a flat surface against a flat surface, allowing for necessary clearance in bearings, etc., and maintain this clearance. Shear on the fibers can be modified through the plate design.

It will be seen, from the foregoing that no one of the above units fully meets our specification for an ideal refiner. What then does? There is none—but we more nearly attain it in the conical plug and shell type that resembles, but is not, a jordan.

Conical Plug and Shell

The conical plug refiner is designed to secure a high peripheral speed, with resulting centrifugal force. The value of centrifugal force can be shown by an example:

We had a client making an asbestos fiber product in which it was desired to thoroughly mix and precipitate colloidal lead. Passing through the Miami pulper the asbestos fibers were brushed out thoroughly with no evidence of being shortened. The colloidal lead was then added and immediately all vestige of fiber disappeared and we had only a jelly. This was due to the clinging of the colloidal lead to the fibers, their specific weight had been so increased that the inertia of the fiber, when striking the wall of the pulper chamber, literally destroyed it. Slowing down the unit overcame the difficulty and a two-speed drive enabled us to first thresh the fibers to debundle them, and then drop to the low speed for mixing.

To understand what happens to a fiber, under these conditions, let us resort to a simple experiment. If we take a common caterpillar or worm and drop it to the side walk, it retains its composure and ambles away. On the other hand, if we wind up like a baseball pitcher and aim at the side walk, we get a worm capable of hydration. It is crude but it shows the point. Throw this worm into a cup shaped chamber so that before the last part of it is in, the first part is already coming out and you have the full significance of what happens to a fiber in a properly designed conical refiner, due to centrifugal force. Now combine this function with rapidly passing bars that just clear each other and we obtain a crushing and splintering effect on the fibers, that brings out their inherent flexibility.

The refiner is designed to handle relatively high consistencies, that is, 6 to 8 per cent on groundwood, sulphate, soda and similar stocks and 5 per cent on kraft.

By using alloy metal castings for both the plug and the shell fillings, the angularity of shear can be set to suit the stock being made. By throttling the discharge, the stock can be made to hurdle the spiral bars and in this way rapid hydration can be secured; hence *dwell* is controllable.

The plug of a conical refiner can be more accurately positioned due to the fact that considerable longitudinal travel is required to bring the bars closer together, depending on the included angle of the cone. This permits a vernier adjustment without elaborate mechanism.

Due to the high speed of the plug, it is naturally small in diameter. This means that the outside dimen-

sions of the refiner are relatively small, and the frames of high speed motors are small, hence the space requirements are less.

Cyclifiner

Referring back to the pulper for a moment, if we attach a conical refiner to the Miami pulper, it is possible as soon as pulping is complete, to use the tub as a retaining and circulating chest and *cycle* the stock through the refiner and back to the tub until the desired effect is secured. Hence, the name Cyclifiner, Fig. 4, has been given to the refiner. The same effect can be secured on your present stock by changing your chest to a midfeather type. The number of times the stock passes through the Cyclifiner can be determined by dividing the total gallons by the rate of the Cyclifiner which will range from 800 to 2500 gal. per min., depending on the size of unit.

Most refining action is today given in terms of freeness, although this does not tell the whole story. The freeness drop desired will vary with different stocks as well as the freeness drop per pass through the Cyclifiner. However, as a general rule on ordinary papers using sulphate, groundwood and soda, five passes meet the maximum requirements. On hard stock, such as kraft, Mitscherlich, etc., provision should be made for 10 passes or more. On soft stocks, such as soda, groundwood, and sulphite, Cyclifiner at 6 to 8 per cent and for kraft use a consistency of approximately 5 per cent.

A large number of refiners have been attached to existing beaters, but the results do not compare with the midfeather method where all the stock passes through the refiner. Mixing the already refined stock in the large mass of unrefined, results in a few fibers receiving too much treatment, some just right and others, none at all. It is far better to pass all the stock through the refiner once, before any of it passes through the second time.

Factors to Consider in Refining

There are a few points to be considered that spell the difference between failure and success. Remember, your stock should be from about 6 to 8 per cent for best results, and stock at that consistency does not flow in a strict sense of the word, but rather tumbles along. This tumbling effect is what causes heavy stock to bridge over an opening.

The stock in contact with the surface of the pipe lags, while the center literally rolls through on small rollers of stock.

In order to handle sufficient stock at high density we must have a large suction pipe to the refiner, hence trouble is apt to occur if the pipe is reduced to the size of openings in refiner. Check the openings to the throat and do not use less than 10 in. This reasoning also applies to the cleanout openings. When you open a cleanout, you want to do just that, not take an hour to figure what tool will be necessary to remove the stock. Compare them and get one big enough.

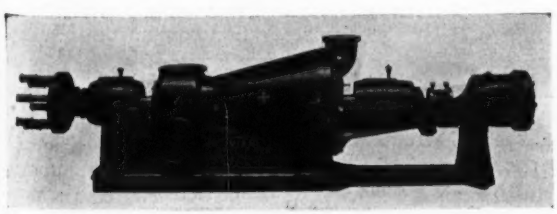


FIG. 4.

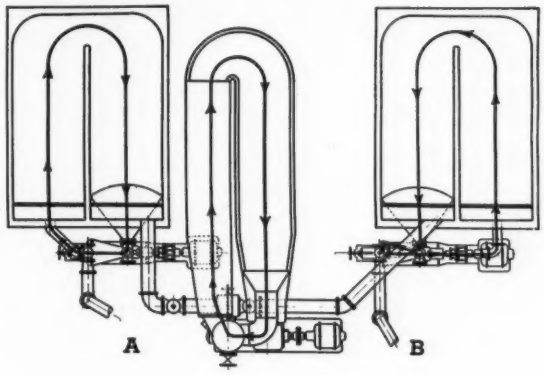


FIG. 5.

The very design and function of a refiner places its logical location in the basement while, you will probably want the controls on the first floor. To adjust the plug by remote control involves some arrangement that permits withdrawal of the plug when starting and the return to the operating position when it is up to speed. Any mechanical arrangement will have sufficient lag in linkage to be misleading when setting the plug by feel. It takes longer to reach the same setting by hand adjustment than if predetermined stops are provided. These predetermined stops are built into the Cyclifiner and the in and out positions are secured by a hydraulic transmission. These stops prevent any possibility of the plug running in and giving a cushioning effect should any stray metal accidentally get into it.

The Cyclifiner is in successful operation on straw, kraft, sulphite, groundwood, shavings, box clippings, bottle cap and filler stock. In these respective installations it was possible to ease off on the jordans, over the previous operations using beaters.

The stock preparation of tomorrow will follow these lines, Fig. 5: Pulp in a high density pulper; drop to chest A, to which is connected a Cyclifiner; repeating furnish in pulper, dropping to chest B equipped with a second Cyclifiner; as soon as the stock in the first chest has been refined, throw over with the Cyclifiner or pump to the jordan chest; give light jordaning to the machine. In some cases the jordan will be eliminated, as has already been done in one instance on boxboard filler.

Intermixing and Agitation

The poor we have always with us. The same might be said of stock agitation—and most of it is poor. It is doubtful if any one phase of stock preparation has been more neglected than that of agitation. It is much like Mark Twain's weather: Everybody talks about it, but nobody does anything.

The latest equipment for pulping and refining may be installed so that almost perfect preparation is possible and then this ideal stock is dropped into an old square cornered, paddle equipped, chest.

We hear the subject of closer beater room control discussed on all sides. Instruments are being installed to closely ascertain just what is being done to the stock. Among them are various designs of consistency controls that work, which is a tribute to the engineering research back of them. But how much

easier would be their job if the stock coming to them had been thoroughly agitated and *intermixed.*

There are, you might say, three types of agitators, the paddle or swash plate design, the propeller or plain circulating type, and the combined circulating and *intermixing type.*

Paddle Type

The paddle type agitator has been used because it is one of the simplest mechanisms known to man and after the first papermaker found that it worked to a certain extent, everybody naturally followed suit.

For years, the lubrication problem on agitator gears kept oil companies all over the country concocting various mixtures to meet the conditions. Today the use of compact gearhead motors eliminate this need. Still the same old paddles and shafts in the same old chests are used to accomplish one of the most important phases of stock preparation.

There are two major defects in the paddle agitator: Inability to blend the stock dropped from two different beaters or pulpers at consistencies over 2½ to 3 per cent. Even this consistency requires a long time to give near uniform results, and by that time the chest is empty, the paper has already been made. At high consistency the stock simply moves aside, allowing the paddle to pass, and then returns to its previous position, just the same as a rubber band is deflected. No mixing takes place from top to bottom and it is not uncommon to find hard crusts on the surface that sooner or later will drop into the pump causing the condition that Arthur B. Green spoke about in his paper entitled Stock Preparation Control 1939, wherein he said, "A mill will be so fixed that sudden slugs of thick stock come over to the jordans with every beater dump and a major job of reconstruction would be envolved in correcting that fault." It is generally agreed that it is better to correct a fault at its source than to add another piece of equipment to correct the faults of the preceding equipment. Do not think for a moment that a control may not be necessary, but its job is a lot easier when it does not have to compensate for such wide variation in consistency.

Swash Plate and Circulating Types

The swash plate design, which is a circular steel sheet set on the shaft at an angle, overcomes some of the faults, of the paddle type, but we still have places for stock lodgment and it is ineffective at high consistencies.

The purely circulating type goes only part of the way towards securing proper agitation. It simply moves the stock from one side of a midfeather chest to the other side by means of a propeller but there is no *intermixing* of the stock. It is also necessary to go into the chest to inspect or to make minor repairs.

Both of the preceding types make no attempt to maintain constant conditions on the pump drawing from the chest. A plunger pump never discriminates. It will pump so much water, or so much stock, providing the stock will flow to it. A centrifugal pump is temperamental, given varying suction conditions, the discharge delivery will likewise vary. Hence, the two types of agitators discussed do nothing to enable the pump, which is the next unit in line, to give uniform delivery of a given tonnage of finished paper.

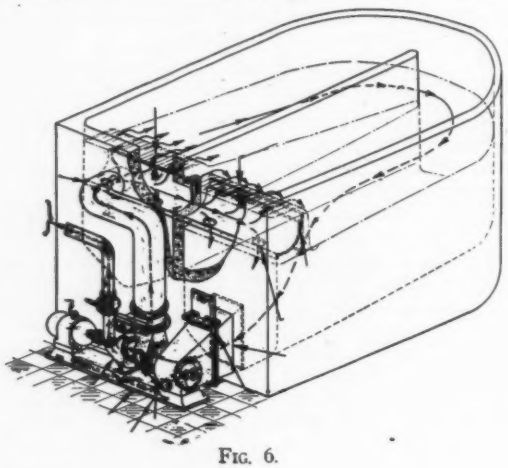


Fig. 6.

Intermixing Type

The last type of circulating and *intermixing* agitator produces more than just circulation. Agitation is only necessary to keep the fibers in thoroughly suspended condition until laid on the wire of the machine, with one exception; that is, blending of stock. The only way you can blend stock either for color or different types of fibers, is by intermixing.

If you have ever watched a housepainter mix paints, he uses a paddle only to pry loose the pigment, after which he pours the pigment and oil from one bucket to another repeatedly, until all lumps are reduced and the different colors are diffused to the exact tone he wants. Is not that what you want to do with your stock? You not only want movement of the stock, you want intermixing of the stock, and you want to deliver this stock to your screens while it is in its greatest state of suspension.

The unit for this purpose has been given the name of Agiflo pump, a combination circulating agitator and centrifugal pump, used in conjunction with scientifically designed baffles, to deliver a constant volume of thoroughly mixed paper stock, Fig. 6. A number of mills run with Agi-flow pumps exclusively and one mill has dispensed with the head box and overflow return to the chest, due to the constant volume delivery secured.

At least three mills are running today entirely independent of beaters by using the pulper and Cyclifining methods, as well as Agi-flo pumps. It has proven a paying proposition and the installations have proven a success from every standpoint except one, the men still refer to it as the "beater room".

There are four major problems to stock preparation. We have covered three of them. The question of screening is simply to make sure that no fibers that have not been sufficiently processed get into your sheet. Obviously, if pulping, refining, and agitation are properly done, the screens will work at full efficiency and with fewer rejects. A number of mills who think they need more screening capacity, in reality need better stock preparation ahead of the screens.

The question of stock preparation is not my problem, it is yours. How well you prepare tomorrow's stock depends upon how well you apply your knowledge of today's stock preparation equipment.

Soundview Earns $106,862

The Soundview Pulp Company and subsidiaries for the five months to May 31 report a net income of $106,862, equal to 11 cents a share on the common stock, against $284,564 or 47 cents a share in same period a year ago.

Some Applications of Corrosion Resisting Metals and Alloys in the Pulp and Paper Industry*

By F. L. LaQue [1]

When the writer was invited to prepare this paper he agreed to attempt the job with the understanding that he would be permitted to add the restricting word 'some' to the title originally suggested. Even with this qualification, it was impossible to cover the subject adequately in a paper such as this. Most of the space will be devoted to alloys containing nickel, since these are naturally the ones with which the author is most familiar.

To facilitate a systematic treatment of the subject, there has been reproduced *(1)*, Fig. 1 a chart outlining the steps in the manufacture of pulp and paper by the several processes. The numerous applications of corrosion resisting materials to be discussed will be referred to this flow sheet.

To avoid several repetitions of the chemical compositions of certain of the corrosion resisting materials to be discussed, the following notes will apply wherever these alloys are mentioned.

The term *stainless steel* will refer to the austenitic variety containing approximately 18 per cent chromium and 8 per cent nickel, except in those cases where the composition of the stainless steel will be described otherwise.

The term *Ni-Resist*[2] will refer to the austenitic cast iron containing approximately 14 per cent nickel, 6 per cent copper, and 2 per cent chromium.

The term *Monel*[3] will refer to the alloy containing approximately 67 per cent nickel and 30 per cent copper.

The term *silicon bronze* will refer to copper alloyed with about 3 per cent silicon plus smaller amounts of such elements as manganese, tin and zinc.

Mechanical Pulping Equipment

Since the conversion of logs into mechanical or groundwood pulp does not involve treatment with corrosive chemicals, there has not been any general use of corrosion resisting materials in connection with pulp grinding equipment. (4), Fig. 1. However, with certain varieties of wood, such as are used for ground wood pulp on the West Coast, appreciable amounts of corrosive organic acids are liberated during the grinding process. This has led to the use there of stainless steel castings containing from 14 to 18 per cent chromium for pulp stone flanges and for grinder pockets. A corrosion resisting alloy has been required, not only to increase the life of the grinders, but also to prevent contamination of the pulp by excessive amounts of iron which would cause discoloration by reacting with the tannin compounds present.

Many pulp stone flanges are fastened to the grinder shafts by means of bronze bushings or nuts which

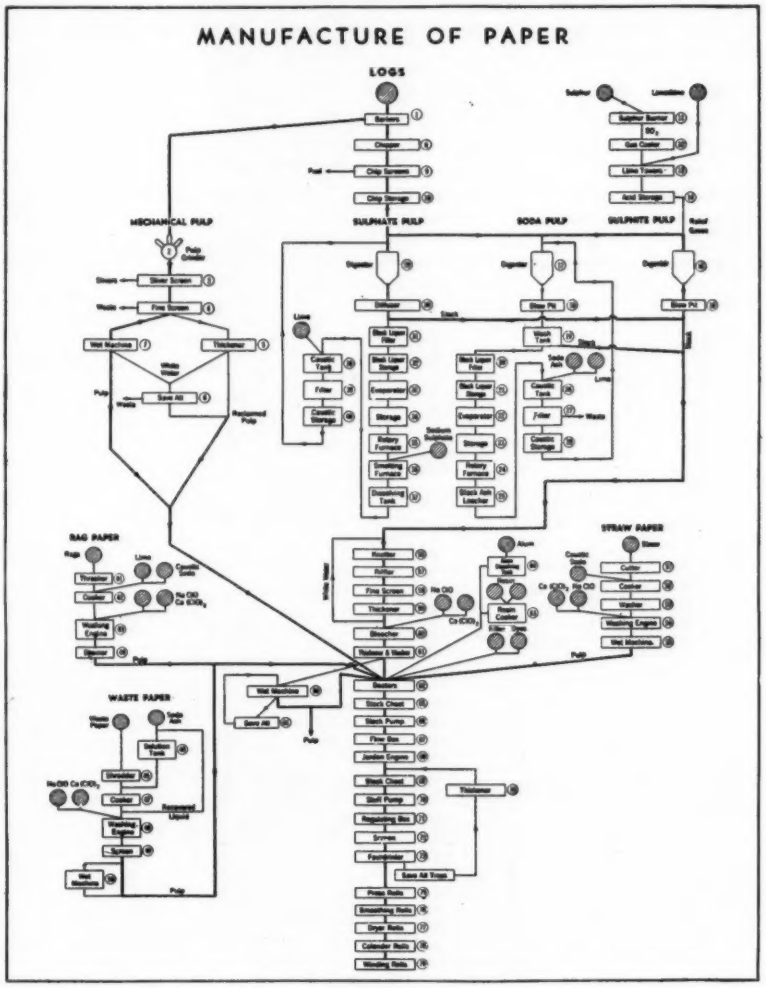


FIG. 1.

* Presented at the Annual Convention of the American Pulp and Paper Mill Superintendents Association, Wardman Park Hotel, Washington, D. C., June 13-15, 1939.

[1] Assistant Director, Technical Service on Mill Products, Development and Research Division, International Nickel Company, Inc., New York, N. Y.

[2] Reg. U. S. Pat. Office—Can. Pat. No. 278,180.

[3] Reg. U. S. Pat. Office.

are set into the cast iron flanges. In several cases, especially where the stock has been acid, or where the logs have been in sea water, there has been serious corrosion of the threads on the steel grinder shafts where they have been in contact with the bronze nuts. As a possible means of overcoming this difficulty, some trials have been made by substituting Ni-Resist for the bronze on the basis that the former would provide adequate corrosion resistance while, at the same time, the galvanic potential between the Ni-Resist and the steel shaft would be less than between bronze and steel. While some encouraging results have been obtained with this combination, it would appear from a recent survey that a complete solution of the problem will require improvements in the method of installing the bushings and of protecting the threads from actual contact with the corrosive solutions.

Sulphite Pulping Equipment

During the past ten years there has been a great change in the use of materials for sulphite pulp mills. This has, of course, been brought about by the introduction and very extensive use of stainless steel *(2)*. Previously, most of the equipment was made of lead, or of copper and its alloys. While lead is still the preferred material for sulphur dioxide gas coolers, much of the remaining equipment with the principal exceptions of acid towers and tanks, digesters, accumulators and blow pits, is being made of stainless steel.

The adoption of stainless steel for these many applications has not only effected savings in maintenance expense, but in addition has made practicable such process improvements as indirect heating and circulating systems, 'hot acid' systems, and automatic pressure and temperature control.

In an earlier paper *(3)* the author described these alloys with particular reference to their applications in sulphite pulping. The reader is referred to this article for details. It will suffice, here, to reproduce the diagram, Fig. 2, illustrating the most important applications of stainless steels.

For sulphite pulping, the most generally satisfactory wrought material is the alloy containing approximately 18 to 20 per cent chromium, 9 to 14 per cent nickel, and 2 to 3 per cent molybdenum. Molybdenum is a desirable constituent for many purposes and is used to best advantage to supplement chromium rather than to replace this element.

For metallurgical reasons, it is desirable to preserve the austenitic structure in the alloys containing molybdenum. It is better to do this by increasing the nickel to around 12 to 14 per cent rather than by reducing the chromium content. For castings, the preference is for similar alloys, or the more highly alloyed compositions containing from 25 to 30 per cent chromium and 10 to 15 per cent nickel with, in some cases, a small percentage of molybdenum as well.

Piping and Tubing

For some time, it was not possible to get seamless tubes for cooking liquor heaters and pipe lines made of the alloys containing molybdenum. However, welded tubing of the desired compositions has been available, and, more recently, satisfactory seamless tubing has been developed. In addition, there have been seamless tubes of a composition containing about 26 per cent chromium, 5 per cent nickel and 1.5 per cent molybdenum.

In addition to wrought metal for piping, there is available centrifugally cast pipe of the popular 28 per cent chromium, 10 per cent nickel composition, as well as other common alloys. Such centrifugally cast pipe is being used very successfully for acid lines, relief lines, and the like, especially in connection with hot acid and digester circulation systems.

To obtain best results with stainless steels in sul-

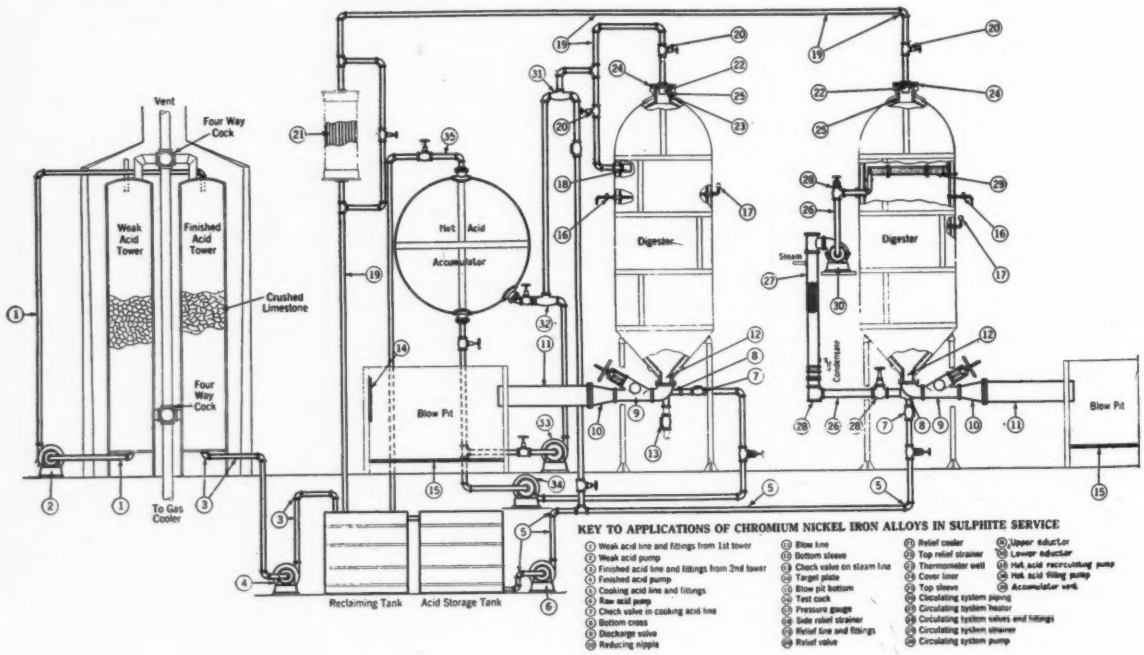


FIG. 2.

phite pulping equipment, the following suggestions are offered:

Be sure that castings or welded structures either are heat treated properly before use, or are so constituted that the heat treatment may be eliminated.

Control the composition of the cooking liquor so that scale will not deposit on the alloy surfaces. If scale does form, arrange to clean it out regularly.

Arrange relief lines so that they are completely drained or blown out during shut down periods.

Avoid, if possible, the combination of stainless steels with copper alloys since one or the other may suffer accelerated corrosion. Do not use packings containing graphite if other satisfactory packings are available.

Keep chlorine out of the cooking liquor. Results of investigations carried out in Sweden have indicated that the safe upper limit for the sodium chloride content of the water used for acid making is 0.4 per cent *(4)*.

Digesters and other Pressure Vessels

Up to now no full sized digesters have been constructed of stainless steel. However, there are a number of relatively small experimental digesters which have been used successfully for several years. Furthermore, during the past few years, there have been developed some new processes for attaching stainless steel sheets to large and thick carbon steel plates for use in the construction of pressure vessels, principally for use under severely corrosive conditions in the petroleum refining industry. It, therefore, seems reasonable to look forward to the time when similar composite materials will be used successfully for the construction of full size sulphite digesters. The principal drawback at the present time is the difficulty of arranging for the desired stress relief annealing after field erection of digesters too large to ship.

Both cast iron and bronze have been used commonly for blow pipes on sulphite digesters. Some years ago Ni-Resist was adopted for this purpose and has been generally satisfactory, especially where the lines are located so that they blow clean. The best materials for blow lines are the stainless steels used for other sulphite pulping equipment. Stainless steel blow lines are especially desirable where, as in the case of rayon pulp, it is necessary to protect the product from contamination by metal corrosion products.

Soda and Sulphate Pulping and Caustic Recovery

When compared with the sulphite process, the corrosion problems in the soda and sulphate processes are by no means severe, and many of them can be solved by the use of ordinary steel or cast iron, or by alloy steels and irons containing relatively small percentages of alloying elements. The presence of both organic and inorganic sulphur compounds in the sulphate process makes this process more corrosive than the soda process. Nevertheless, the same corrosion resisting alloys are adequate for both processes, and, to simplify the discussion, they will be considered together here.

One of the earliest investigations of corrosion by sulphate process liquors was carried out by C. H. McGregor *(5)*. He found that the stainless steels and Monel were highly resistant to corrosion by the alkaline solutions. More recently the Materials of Construction Committee of TAPPI has reported the results of a survey of materials of construction in kraft pulp mills. *(6)*.

Digesters

Ordinary steel is usually adequate for digester construction (17, 29), Fig. 1, although in some instances stainless steel and Monel sheets have been welded into the lower parts of the digester cones in the vicinity of the steam inlets where erosion and corrosion are most pronounced.

Monel and stainless steel are used to a considerable extent for the working parts of digester steam and cooking liquor valves and blow off valves. Both materials also are being used successfully for perforated strainers in circulating systems.

Ni-Resist is being used for blow valves. One user of Ni-Resist for this purpose has reported that whereas cast iron valves were good for less than six months, Ni-Resist valves have been in service for twenty months without any leakage or repairs.

In a typical case, a mill reported that the installation of Monel tubes in the heater on a soda pulp digester circulating system about ten years ago solved the problem of heater tube corrosion and eliminated the repeated expense of dismantling the heater for tube replacements.

According to a recent survey *(7)*, stainless steel is the most widely used material for tubes and tube sheets in circulating system heaters in kraft pulp digesters.

In one case, some trouble was experienced due to the greater thermal expansion of stainless steel as compared with mild steel which resulted in bowing of the stainless steel tubes so that the scale which formed could not be removed without harming the tubes. This problem was solved by installing Inconel[4] tubes (80 per cent nickel, 13 per cent chromium, 7 per cent iron). Inconel has the same coefficient expansion as mild steel and is at least equal to stainless steel in resisting corrosion by sulphate cooking liquors. The Inconel tubes remained straight and could be cleaned readily.

Diffusers

The perforated false bottoms in diffusers (30) Fig. 1, have usually been made of steel which requires frequent removal, often on account of failure by cracking. Such cracking is usually associated with corrosion in the form of pitting between the perforations which weakens the steel so that it fails mechanically. In some cases, the holes become enlarged by corrosion sufficiently to make it necessary to replace the plates in order to maintain the required efficiency of screening and to keep an excessive amount of fibers from getting into the black liquor evaporators.

About seven years ago, one mill installed Monel screens in the bottom of a diffuser. These screens are still in service, whereas it has been necessary to replace steel screens every twelve to eighteen months. More recently, another mill installed Monel screens in sixteen diffusers. An important advantage of this alloy for this service is that it can be perforated with small holes without having to be made so thin that a danger of failure by cracking is introduced.

In several cases there has been severe pitting of the bottom tier of steel plates in diffusers. This has amounted to as much as 1/10 inch in the first year. Fortunately, there is some evidence to indicate that the rate of pitting decreases with time. Corrosion tests in diffusers have shown that Monel, nickel, Inconel and stainless steel are highly resistant to corrosion and that 5 per cent nickel steel is considerably better than mild steel so far as pitting is concerned. For new construction, the use of this alloy, or of nickel clad steel, in the bottom sections is suggested, while for the salvaging of old vessels, corrosion resisting metal linings may be installed.

[4] Reg. U. S. Pat. Office.

Recovery Equipment

There are several corrosion problems in connection with the alkali recovery processes (19 to 28 and 31 to 40), Fig. 1, and the solutions to these are provided by a variety of materials ranging in cost and corrosion resistance from steels and irons containing from 1 to 5 per cent nickel through Ni-Resist to such materials as the stainless steels and Monel. It is desirable to match the alloy to the severity of the corrosion problem, and, in many cases, the more economical low alloy steels and irons and Ni-Resist will suffice, with stainless steel and Monel being reserved for the toughest problems.

Alloy cast irons containing up to 5 per cent nickel are used extensively for the structural parts of black liquor filters (20, 31), Fig. 1, equipped with Monel wire cloth covers.

Alloy cast iron is used also for valve bodies on black liquor, green liquor and white liquor pipe lines. Such valves are usually trimmed with Monel or stainless steel. In a particular case, valve bodies made of 1.5 per cent nickel cast iron were found to be at least twice as durable as plain cast iron valves.

For the more severe conditions of black liquor handling, such as for valves on evaporators and for impellers and casings of black liquor pumps, Ni-Resist is a highly satisfactory material. In a typical case Ni-Resist impellers on black liquor pumps were reported to outlast cast iron from four to six times, and a Ni-Resist pump handling cooking liquor was reported to have operated for over three years without trouble, whereas plain cast iron used in the same service was good for less than six months.

Ni-Resist pipe has been used with success for handling the condensate from black liquor evaporators. In one case a 4-inch Ni-Resist line was still in good condition after two years, while extra heavy steel pipe which the Ni-Resist replaced was good for only four or five months.

Valve bodies made of Causul metal, a modification of Ni-Resist, have also performed very satisfactorily in contact with the most corrosive alkaline liquors.

Pumps and Wire Cloth

Ni-Resist is being used successfully for propeller type agitators and for drag bars in causticizing tanks. Stainless steel pumps and impellers have been used extensively for circulating and transfer pumps on black liquor evaporators and concentrators and for other types of service in the caustic recovery plants. Monel is used for pump shafts and impellers in pumps handling black liquor, green liquor, and white liquor under all conditions, and for removing condensate from evaporator steam chests. The harder 'H' and 'S' Monel[5] castings are specially useful where the liquors are abrasive as well as corrosive, as in the case of the liquor pumped from causticizing tanks to settlers and the mixtures of black liquor and sodium sulphate pumped from the evaporators to the smelting furnaces. Wrought 'K' Monel[5] which may be hardened by heat treatment has been found to be an excellent material for pump shafts and pump rods where abrasion, as well as corrosion, is a problem.

Monel is the preferred material for the wire cloth covers on lime mud filters. Its advantages for this service include resistance to corrosion not only by the alkaline liquors, but also by the hydrochloric acid used to clean the wire cloth.

[5] Reg. U. S. Pat. Office.

Tubes in Evaporators

Corrosion of tubes in black liquor evaporators is often a serious matter. In the case of soda process liquors, Monel provides an effective solution under the most severe conditions. In one case, Monel tubes were found to be unattacked after eight years where ordinary steel failed in twelve to fifteen months in the high density effect of a multiple effect evaporator.

In the sulphate process, stainless steel is the most commonly used material for the tubes and for the liquor side of the tube sheets in forced circulation concentrators, and occasionally for the high density effects of multiple effect evaporators. Stainless steel tubes are still in excellent condition after use for seven years in a forced circulation black liquor evaporator. Inconel is a highly satisfactory material for this service, although it has not been used as extensively as stainless steel. Where stainless steel tubes are used in mild steel steam chests, it is desirable, if not actually necessary, to take care of thermal expansion of the tubes by having the bottom tube sheet free to move, or floating. Where stainless steel tubes are used in mild steel tube sheets, it has been found that the mild steel suffers accelerated corrosion around the ends of the tubes. Consequently, the tube sheets should be of stainless steel or covered with stainless steel on the liquor side.

Recently the long tube vertical type of evaporator has become popular for black liquor concentration. By the use of this type of evaporator it is possible to achieve higher liquor densities and correspondingly better heat recovery from the smelting furnace. The average life of 10 gage mild steel tubes in the high density effect of these evaporators appears to be about fifteen months, with occasional failures in much shorter periods. A recent survey has indicated that severe corrosion may be expected where the temperature exceeds 220 deg. F. and the liquor concentration more than 40 per cent solids. The higher the sulphidity, the more severe is the corrosion, with 25 per cent sulphidity representing an average condition.

In some cases the cost of re-tubing evaporators with stainless steel tubes cannot be justified. Experience with 5 per cent nickel steel tubes which, in particular cases, have shown a life from three to four times that of mild steel indicates that this alloy steel may provide an economical solution to evaporator tube problems in such cases. This conclusion is supported also by the good performance of nickel cast irons in black liquor service.

Furnaces

Stainless steel containing from 25 to 30 per cent chromium and about 10 per cent nickel has been one of the most satisfactory materials for smelter spouts. Experience has shown that attention given to the proper design and water cooling of the spouts is the best means of increasing their useful life. Some of the conditions that favor good service are:

A good supply of water in the form of condensate or otherwise treated to prevent scale formation and clogging of the water passages.
The use of generously proportioned water supply lines and sufficient pressure to insure adequate flow through the jackets.
A spout having a steep pitch and a smooth inside surface so as to favor rapid flow of the smelt.

Heat resisting chromium-iron and chromium-nickel-iron alloys are required for the rabble arm

shoes in the Nichols-Hersshoff calcining furnaces which are coming into use for lime reburning. For the highest operating temperatures, alloys of the 28 per cent chromium, 10 per cent nickel type are suggested. Similar heat resisting alloys are required for thermocouple protection tubes used with these and other types of lime burning furnaces and kilns.

Screening Equipment

To avoid repetition, the uses of corrosion resisting materials in screening equipment (3, 4, 58, 72,) Fig. 1, for all types of pulp will be discussed here. The most important applications are in connection with equipment for fine screening where resistance to both corrosion and wear is required to avoid rapid enlargement of the screening holes or slots. The principal types of fine screening equipment are cylindrical, rotary, or centrifugal screens and flat screens which will be discussed separately.

Rotary or Centrifugal Screens

Bronze has been used commonly for the structural parts and impellers of rotary or centrifugal screens. A couple of years ago a Canadian newsprint mill installed Ni-Resist runners in their quiller screens to replace bronze which had failed by erosion. The Ni-Resist runners were cheaper and give promise of being adequately durable.

Copper, brass, and bronze have been the standard materials for the perforated plates used to form the cylinders in rotary screens in groundwood and sulphite mills, while steel has been used widely in sulphate mills. For some time it was difficult to find more durable corrosion resisting materials since, when the hardness of the material was increased to improve resistance to wear, difficulties in perforating the harder metals were encountered. If the thickness of the metal was reduced to facilitate perforating, there was a sacrifice of much of the strength and stiffness required to prevent failure by bursting or cracking from fatigue.

During the past few years, there has been considerable improvement in the qualities of the Monel furnished for perforating and in the technique of perforating Monel plates. As a result, a wide use of perforated Monel screen plates for rotary screens in groundwood, sulphate, and sulphite mills has developed. Monel plates can be obtained with perforations 0.045 inch and larger and in gauges 0.037 inch and heavier. Perforated Monel plates are used for both fine screens and tailing screens, as well as knotters.

In both groundwood and sulphite mills Monel screen plates consistently outlast copper, since a considerably longer period is required for the perforations to enlarge beyond allowable limits. In a typical case, the perforations in Monel plates enlarged only from 0.060 to 0.064 inch in 500 days, whereas with copper plates the holes enlarged from 0.058 to 0.065 inch in 150 days. In another case, some Monel screens handling groundwood stock have achieved the remarkable record of having the diameter of the perforations increase only 0.002 inch (from 0.062 inch to 0.064 inch) in five years. Users have reported a reduction in the number of plates that fail by bursting.

In the case of sulphate mills, it has not been practicable to use perforated copper screens because of the inadequate resistance of copper to corrosion by the alkaline sulphide solutions encountered. The life of perforated steel screens in sulphate mills has usually been short, since the perforations are enlarged by corrosion. In many cases, also, the corrosion develops rough edges on the perforations which favor the retention of fibers and eventually lead to clogging of the screens and subsequent bursting of the plates. The ability of Monel plates to withstand corrosion by the alkaline process liquors keeps the holes from enlarging and they remain smooth and relatively free from clogging and bursting. There have been some installations of perforated stainless steel plates in rotary screens in kraft mills.

Certain types of cylindrical fine screens, and especially those used immediately ahead of the Fourdrinier, (72) Fig. 1, are equipped with slotted rather than perforated screen plates. Copper and bronze have been the most commonly used materials for these slotted plates. As a result of wear and corrosion, the width of the slots increases and finally exceeds the allowable limit. When this occurs, it is necessary to re-roll and re-slot the plates. Chromium plating has been used to increase the useful life of these copper and bronze plates. There has been some interest in the substitution of Monel and stainless steel for the commonly used copper and bronze.

In connection with slotted stainless steel plates for rotary screens, there has been a considerable application of the thin sheet metal plates to be described in greater detail under the heading of plates for flat screens. It has been relatively simple to adapt these plates for use on the common types of rotary screen, including those fitted with multisided drums.

Flat Screens

One of the most common types of fine screen is the flat screen in which the fibers are drawn through the slots in the screen plates under the influence of a suction caused by a pulsating diaphragm below the plates. The plates for these flat screens are usually of bronze castings in which the required slots are in groups with metal for reinforcement being left between the rows of slots and around the margins. The fine slots are undercut by wider slots to facilitate drainage.

As in the case of perforated and slotted plates for rotary screens, the slots in the flat screen plates tend to become enlarged by wear and corrosion and it is necessary from time to time to re-roll and re-cut the plates in order to restore the original slot width.

A distinct improvement in flat screen plates has been effected by the use of chromium plating over the bronze. The chromium plated plates have been generally successful. The most important advantages claimed for them have been:

The superior hardness and corrosion resistance of the chromium plating, the accuracy of the slot width is maintained for longer periods and the useful life of the plates is thereby prolonged.

The smooth, slick surface of the chromium plating resists the adherence of pitch and fibers; stringing and clogging are eliminated and the slots stay clean.

There have been cases where chromium plating could not be applied successfully because the design of the plates did not permit a heavy enough chromium plate to be deposited deep into the slots. More recently, this difficulty has been overcome by improved styles of plates cut especially for plating. There also have been some experiments with the use of nickel plating to supplement chromium plating. There are certain types of applications where the nickel proves to have distinct advantages and plating experts are offering either of the two materials, specifying the one that is most satisfactory for the

particular mill conditions. With special steps in the plating, the nickel is beneficial in recovering used plates.

In some mills, chromium plated plates have not been successful because of the use of hydrochloric (muriatic) acid to clean the plates. This acid attacks chromium rapidly, and, consequently, the life of the chromium deposit may be short in such service. The use of nickel plating may be of considerable help because nickel is highly resistant to corrosion by hydrochloric acid, and a suitable method for nickel plating screen plates has been developed. Recent experience with properly processed nickel plated plates, where hydrochloric acid is used for cleaning, has been very encouraging.

There has been developed a new type of flat screen fabricated from 1/16-inch thick stainless steel sheet or strip suitably reinforced. The advantages claimed for these plates include:

The stainless steel is practically immune to wear and corrosion. In a typical case, it was reported that there was no appreciable slot wear in four years.

The plates have an unusually high capacity associated with their free screening characteristics which are based on the facts that the slots are of uniform depth from end to end; there is no undercutting of the slots, therefore, no restrictions or crevices at the ends of the slots.

The stainless steel resists the adherence of pitch and can be cleaned readily. Lime deposits may be removed by treatment with nitric acid without harm to the plates.

Screen Plate Screws of Monel

Screws are commonly used to fasten screen plates to their supports. Monel has been used to a considerable extent for these screws and has the advantage that it is not weakened by corrosion so that the screws can always be removed and replaced without danger of the heads being twisted off. This avoids the consequent nuisance and expense of drilling out broken screws.

Pulp Thickeners, Deckers, Washers and Wet Machines

All these devices function to separate pulp fibers from the liquid in which they are suspended, while at the same time they may be used to wash the stock free from residual chemicals with which it may have been treated previously as in the case of pulp from digesters and bleachers. In every case, the operation is one of filtration by gravity through the wire cloth covering of an open cylinder, or with the aid of vacuum through a similar covering on a closed drum. In addition, there are disc or leaf type vacuum filters and pressure filters.

A typical open-end gravity flow cylinder is shown in Fig. 3. It consists of a series of spiders (usually bronze) mounted on a central shaft and across which are placed in appropriate grooves a series of parallel longitudinal rods usually about 5/16 inch in Diameter. The covering is built up by winding about 12 gage wire around the longitudinal rods as shown. Over this wire is placed a relatively coarse mesh backing wire and over this a fine mesh facing wire. In some cases, there may be added a wrapping or binding wire generally similar to the winding wire over the structural rods. There have been developed some stronger, corduroy type weaves of facing wire which enable such cylinders to be made up satisfactorily without the use of a backing wire.

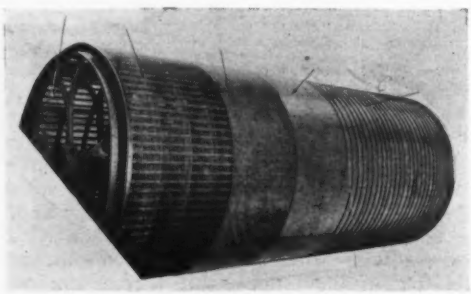


Fig. 3

Courtesy, Cosgrove Wire Cloth Co.
Spiders, Structural Rods, Winding Wire, Backing Wire, Facing Wire and Binding Wire in Cylinder Mold Construction.

In the case of vacuum filters and washers, the drum covering consists usually of a backing wire, a facing wire, and a wrapping or binding wire.

While the spiders on cylinders are usually made of bronze, Ni-Resist has been used successfully on cylinder molds handling groundwood stock. This material should also be satisfactory for use with sulphite and sulphate stock.

Material of Construction for Rods and Wires

The materials chosen for the structural rods, winding and wrapping wire and backing and facing wire for cylinders and vacuum drums vary with the service conditions. It is generally desirable to use the same material throughout, especially in the case of backing and facing wires in order to avoid possible galvanic effects. The danger of galvanic corrosion in paper stock solutions is not as great as is generally believed, however, it is just as well to avoid combinations of dissimilar metals when this can be done conveniently.

Copper, brass and bronze have been used extensively in cylinder mold construction, and, in many cases, it has been the practice to salvage Fourdrinier wires by cutting them up and using them for cylinder mold covers. In recent years, there has been a definite trend towards the use of Monel to replace the copper base alloys for these purposes. Monel structural rods provide superior strength and rigidity, while Monel winding and wrapping wires, cylinder and vacuum drum coverings are more resistant to wear and corrosion.

Summary of Applications for Monel

Referring to Fig. 1, the following are the most important applications of Monel in such equipment:

Groundwood thickener, (5)
Wet machines, (7, 50, 55, 80)
Sulphite, soda and sulphate pulp washers and thickeners, (16, 19, 30, 59, 74)
Alkaline bleached pulp washers and thickeners, (61)
Black liquor filters, (20, 31)
Lime mud filters and washers, (27, 38)
Caustic filters, (39)

For many of these purposes, stainless steel is also being applied. The stainless steel containing about 3 per cent molybdenum in addition to chromium and nickel has been found to be especially suitable for the covering of cylinders and drums used for washing the slightly acid pulp containing free chlorine from the first direct chlorination stage of multiple stage bleaching processes. This alloy is also a most satisfactory material for use with stock containing free sulphurous acid which is often encountered in plants making rayon pulp.

Stock Handling

With the principal exception of bleached stock containing residual chlorine or hypochlorites, most paper stock solutions or suspensions are not sufficiently corrosive to require the use of highly corrosion resistant materials to achieve adequate durability. In particular cases, such as in the manufacture of high quality pulp for rayon manufacture, or in the handling of stock to be bleached, the more extensive use of corrosion resisting stock lines and troughs is desirable, if not actually necessary. For example, a mill producing bleached kraft has Monel stock troughs handling accepted stock from flat screens and stainless steel troughs in the bleach plant. Such use of corrosion resisting materials to keep metal corrosion products out of the stock to be bleached greatly facilitates the production of high quality and high strength bleached pulp and paper.

In certain cases, stock containing sufficient alum to make it slightly acid has caused fairly rapid deterioration of cast iron stock pumps. Bronze has provided an effective solution to many stock pump problems and Monel has been used successfully for plungers and liners of pumps handling abrasive and corrosive stock.

More recently the substitution of Ni-Resist for cast iron, and, in some cases, even for bronze, has resulted in increased pump life due to its high resistance to both corrosion and wear, including such effects as cavitation. Ni-Resist is also being used successfully for large diameter outlet pipes on stock chests.

The growth of slimes in stock lines has been a serious problem in many mills. The substitution of copper *(8)* and silicon bronze for ordinary iron and steel stock lines has proven quite effective in reducing slime troubles. The more extensive use of these materials has been aided by the development of special soldered fittings which has made it possible to use relatively thin walled pipe and tubing in sizes up to twelve inches diameter. Welded fittings used with manganese bronze welding rods on copper, or silicon bronze welding rods on the latter alloy, are becoming popular for pipe lines up to thirty-six inches diameter.

The toxic effect of copper compounds in suppressing the growth of the slime organisms has been credited for some of the success of the copper and silicon bronze piping, but in a recent symposium *(9)* on the subject of slime control there was some indication that the smoothness of the copper piping and its ability to remain smooth were at least as important factors in preventing the accumulation of slime. Experience with such other corrosion resisting materials as Monel and stainless steel, and with smooth nonmetallic materials that would not be expected to have any toxic effects, has tended to support this opinion.

The handling of corrosive, bleached stock containing residual chlorine compounds can be divided into two types of service, the one referring to slightly acid stock from the first stage of bleaching by the direct addition of chlorine, and the other to alkaline bleached, or neutralized, stock.

For the acid bleached stock, experience has shown that the type 316 stainless steel containing about 3 per cent molybdenum in addition to the usual 18 per cent chromium and 8 per cent nickel is generally the most satisfactory material.

For the handling of alkaline bleached stock, Monel is used very extensively. For example, one mill has in service a Monel stock trough installed about eight years ago for conveying alkaline bleached stock from the bleach house to the paper mill. Monel is used successfully for piping and for transfer buggies for handling similar alkaline bleached stock and for carrying white water from bleach washers.

Bleaching Equipment

There has been only a limited use of corrosion resisting materials in bleaching tubs and towers, (60), Fig. 1. Nonmetallic materials, such as tile, wood, and rubber, are usually preferred because of the highly corrosive nature of the solutions, especially in the case of the direct chlorination stage of multistage bleaching. When lime is present for neutralization of acid bleached pulp, or as calcium hypochlorite for bleaching, a protective layer of lime compounds usually forms on cast iron surfaces so that this material may be used with success for agitators, valves, pumps, pipe lines and the like.

Where protective lime compounds cannot be depended upon, the most satisfactory metallic material to resist solutions containing free chlorine is the alloy Hastelloy C (58 per cent nickel, 14 per cent chromium, 17 per cent molybdenum, 5 per cent tungsten, 6 per cent iron). For moderately severe corrosion conditions the stainless steel containing 18 per cent chromium, 8 per cent nickel and 3 per cent molybdenum is generally satisfactory. This alloy is the preferred material for cylinder molds and vacuum type washers and thickeners used in connection with the slightly acid solutions from the direct chlorination stages of multistage bleaching processes. Wire cloth covers can be expected to last from one to two years in such service.

Similarly, Monel is a highly satisfactory material for the covers and winding wire on alkaline bleached pulp washers and thickeners and for the vats and re-pulper sections of washers. The life of Monel wire cloth covers varies from one to five years, depending on the severity of the corrosive conditions.

In the manufacture of rayon pulp, it is sometimes the practice to treat the pulp, in a sort of bleaching operation, with a solution made by dissolving zinc in an excess of sulphurous acid. Stainless steel pumps have been used successfully to handle this solution and the stainless steel containing molybdenum is the preferred material for washers or thickeners handling the treated stock.

Many mills operating bleach plants manufacture their own chlorine by electrolysis. With the chlorine, they produce electrolytic caustic soda which must be concentrated for shipment and use. This concentration is effected most economically in evaporators having nickel clad steel bodies and nickel tubes. At the same time, this use of nickel protects the caustic from metallic contamination so that it will meet the strict specifications of rayon and soap manufacturers.

Alum Handling Equipment

The alum solutions used in connection with paper sizing are sufficiently corrosive as they are made up to require the use of highly corrosive resistant materials for agitators, pumps, piping, valves, and transfer containers (64), Fig. 1.

The silicon iron alloys containing about 14 per cent silicon are highly resistant to corrosion by hot and cold alum solutions and this alloy has been used to

a considerable extent for pumps, agitators and, to some extent, for pipe lines. Its more extensive use for the latter purpose has been prevented by mechanical difficulties associated with the fact that the alloy is quite brittle and unmachinable.

Monel is being used extensively for such purposes as tie rods on wooden dissolving tanks, cast fittings on rubber hose, bodies on rubber diaphragm valves, and for pipe lines under such flow conditions as five gallon per minute through a one inch pipe at 165 deg. F., or one gallon per minute through a half inch pipe. It is used for the construction of alum solution meters and for pails and solution transfer tanks.

Lead is used commonly for such purposes as tank linings, pipe lines, fittings and valves.

Although some of the stainless steels probably have merit for alum handling equipment, the author has had no reports on the performance of these materials in this service.

Somewhat related services include the use of Monel for starch tanks and for color dissolving tanks and color lines. Likewise, Monel is used for size troughs which makes them very easy to clean, and helps in keeping down bacterial growth.

Nickel clad steel is used for the mixers employed in the preparation of clay filler for high grade magazine stock.

Stock Refining

There is no single combination of properties that answers all the requirements for bars in beaters or jordan engines (68), Fig. 1. For example, a metal that is hard enough for one set of service conditions may be too hard for another. Consequently, there is a considerable variety of materials used for beater bars and jordan fillings and any one alloy may be furnished in a range of hardness or temper depending on what is to be accomplished.

There has not been any considerable use of corrosion resisting materials in beaters, except in connection with the manufacture of fine writing papers where phosphor bronze, aluminum bronze and nickel aluminum bronze are used commonly. There have also been some installations of special stainless steels, such as the type containing about 20 per cent nickel and 8 per cent chromium. The discussion to follow will refer particularly to jordan engines.

Jordan Engines

Where the stock is corrosive on account of the presence of alum or other corrosive chemicals, one of the essential requirements for long life is a high degree of corrosion resistance. This is provided by such materials as phosphor bronze, Monel, and various types of stainless steel, including both the straight chromium and chromium nickel types. The choice is most likely to be based on mechanical requirements, because all may demonstrate adequate corrosion resistance under most conditions.

Of the mechanical properties, the most significant are hardness and toughness, the latter usually being measured by impact tests.

As indicated previously, the optimum hardness varies from job to job. In some cases maximum cutting action is desired and this usually requires that the bars be hard and retain sharp cutting edges. Under such circumstances, the straight chromium stainless steels containing from 13 to 17 per cent chromium may be useful. Certain of these alloys are hardened by heat treatment. One user has reported good results with a chromium steel containing about 16 per cent chromium, and having a hardness of about 250 Brinell which was considerably better for his peculiar service conditions than similar steels of lower chromium content.

J. H. Faunce *(10)* reported a case where the common 18-8 chromium nickel stainless steel was used for the plug filling, while a heat treated straight chromium stainless steel was used for the shell filling in a jordan used to shred liner stock in a board mill. After about four and a half months the shell filling, which evidently was too brittle, failed by breaking, while the plug filling was salvaged by straightening the bars which were returned to service and performed satisfactorily.

Experience with bars in jordans operating on rough or harsh kraft stock indicates that the hardness of the bars should be something over 225 Brinell in order to avoid the development of the 'feather edge' which has been observed on softer materials. The required hardness is provided by stainless steel and Monel which are available in a range of hardnesses that exceeds the minimum 225 Brinell required.

It has been observed *(11)* that Monel jordan fillings provide a very useful combination of cutting and brushing effects, being superior to the commonly used phosphor bronze in cutting action, and superior to the hardened stainless steel bars in brushing action. Monel fillings have given service for as long as fourteen years and the intervals between chipping are often longer than with other materials.

Where thorough hydration is required, as in the manufacture of glassine type papers, Monel jordan fillings in both the plug and shell have been especially successful. In such service, Monel bars in the plug have been combined satisfactorily with phosphor bronze in the shell.

In addition to its use for filling bars, Monel has been used to a considerable extent for plug bands formed by welding rings from bar stock. Another interesting application of Monel is in the form of cast sleeves which have been shrunk on worn shafts. Metal deposited by spray guns has been employed to build up worn jordan shafts *(12)*.

There have been developed other types of refining equipment, such as disc refiners in which corrosion resisting alloys have been used. For example, stainless steel discs are used in one type of refiner described by D. M. Sutherland, Jr. *(13)*. Up to now, there apparently has been no practical use of corrosion resisting alloys for the shoes or rotors of the Noblewood mill *(14)*.

Paper Machines

The advantages of smooth corrosion resisting linings for flow boxes or regulating boxes (71), Fig. 1, have been recognized for some time. Copper has been used for such linings and for box construction in the past. Monel and stainless steel have been adopted for the same purpose and there has been some interest in the possibilities of clad materials, such as nickel clad steel.

Several corrosion resisting materials are used for slice parts, such as blades, lips, aprons and adjusting rods, (73), Fig. 1. Chromium plated and bare copper and copper alloys, including brasses and the silicon bronzes, have been employed to a considerable extent. Monel has been found to be especially satis-

factory for slice construction because of its corrosion resistance, strength and stiffness. The latter properties are especially useful in connection with slice lips and blades which must respond uniformly to minute adjustments.

Although a considerable effort is being made to develop more durable alloys for fourdrinier wires, brass and phosphor bronze continue to be the standard materials. In connection with these older materials, there has been a considerable improvement in the production of the alloys, in drawing and weaving them *(15)*, and in applying the proper temper of wire to suit the conditions of service *(16)*. This has naturally resulted in better wire performance. However, the search for more durable alloys continues and it is probable that some new alloys will be introduced in this application in the future.

There has been a considerable increase in the use of such corrosion resisting alloys as Monel, stainless steel, silicon bronzes and copper for save-all trays and spouts used to collect white water. Resistance to corrosion and ease of cleaning are important factors in these applications. In the case of wide machines, the high strength and stiffness of Monel permit the use of light gauge construction which is able to withstand abuse during handling.

Stainless steel has been chosen for similar equipment, especially where the stock contains sulphurous acid.

There has been a similar use of corrosion resisting materials for the fabrication of relatively light weight suction boxes by welding. The preferred materials for this type of construction have been Monel, silicon bronzes, and stainless steel, depending on the particular service requirements.

Although it would appear that nonmetallic materials are favored for suction box covers, there has been some use of corrosion resisting metals and alloys for this purpose. A number of materials have been used, including cast bronze, chromium plated bronze, stainless steel and Monel. In connection with the last, there has been more use abroad than in this country and principally on machines operating under 600 feet per minute. Monel has been used for both perforated and slotted covers and in the form of round edged strip used as wearing surfaces between the wide longitudinal slots of wooden suction box tops. In this service, Monel has been found to maintain a smooth slick surface which reduces wire wear, and it has found favor for the wearing surfaces of felt suction boxes in board mills.

Bronze, brass and Monel are used for the framework and wire cloth covering of dandy rolls. There has been developed a special flat mesh Monel wire cloth covering for dandy rolls which has demonstrated exceptional durability in service. The seams are made by welding and brazing which makes them more resistant to corrosion and strain than the ordinary soft soldered seams.

Several materials are used for table rolls, including brass, aluminum, Monel, and occasionally stainless steel. It has been common practice to cover aluminum table rolls with micarta or similar materials. Monel and stainless steel, being stiffer than the copper base alloys, have an advantage, especially on wide and high speed machines, because for the same weight and span, their deflection is less.

In order to furnish suitable Monel rolls for wide machines which require larger diameter rolls than can be produced in the form of seamless tubing, Monel covered steel, brass and aluminum rolls were made available *(17)*. This development extended the use of Monel covered rolls from table rolls to the several types of rolls used on a typical fourdrinier paper machine, Fig. 4. This method is also satisfactory for salvaging rolls that have suffered excessive wear or are otherwise unsatisfactory.

Chromium plating is used for such applications as press rolls and finishing drier rolls fabricated from steel plate by welding. Nickel plating is used, especially abroad, for drier, wire and felt rolls.

Some miscellaneous applications of Monel and other corrosion resisting alloys around paper machines include fourdrinier rails, bolts and other fastenings, shower pipes and nozzles, and doctor blades on press rolls.

Lead applied as a sprayed coating is being used to protect the framework of fourdrinier machines.

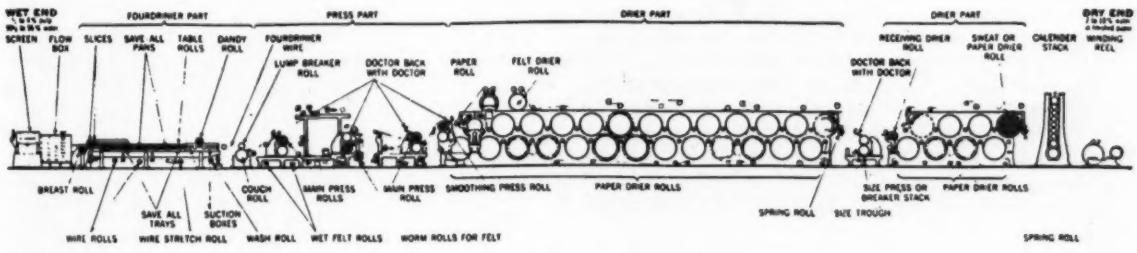
An interesting use of Monel is in the form of cable for hoisting certain parts of fourdrinier machines during the wire changing operations. These cables are left suspended in the vapors above the machine and a corrosion resisting cable is, therefore, required.

Doctor Blades

For many purposes it is desirable that doctor blades be resistant to corrosion, because this property enables the blades to retain a perfect edge for long periods. The most commonly used corrosion resisting alloys are brass, phosphor bronze, silicon bronze, hardened stainless steels, austentitic chromium nickel stainless steels, Monel and 'K' Monel.

Each material has special merit for specific purposes. For example, cold rolled Monel has been found to be especially satisfactory for use on calender rolls because it is free from hard spots, wears slowly and uniformly, and does not score the rolls.

'K' Monel makes an excellent wet creping doctor. In a typical case, a 1/16 inch thick 'K' Monel doctor



Courtesy, Rice, Barton & Fales, Inc.

FIG. 4

Typical Fourdrinier Paper Machine with Monel Covered Rolls Shown in Black.

used against a steel drier roll for wet creping outlasted hardened steel by 23 times. The steel doctors required reconditioning every eight hours, whereas 'K' Monel doctors have operated from seven to ten days without requiring attention. Furthermore, the drier has required no regrinding during the two year period of use of the 'K' Monel doctor.

Tests have indicated that phosphor bronze is the most satisfactory alloy for doctor blades operating on either wet or dry Monel covered rolls.

Calender Rolls

There is no great need of corrosion resistance in calender rolls, (78), Fig. 1, that run dry. However, severe pitting has been noticed in many cases on rolls used for wet calendering. At the present time, there are no highly corrosion resistant alloys that possess the mechanical properties, especially hardness, required for calender roll service. However, a useful improvement in resistance to pitting has been observed with the nickel chromium alloyed chilled iron rolls in which the alloy content was introduced primarily to increase hardness and strength.

With proper care in the mill, chromium plating has proven to be an effective solution to the problem of rusting and pitting of wet calender rolls. The chromium plated rolls give a good finish and are very easy to clean.

Miscellaneous Applications of Corrosion Resisting Materials

Water Treatment

Many mills filter and treat their water supply. Monel is used commonly for wire cloth in water filters and has been used for the troughs in which impurities precipitated from the water are carried to the sewers.

Fiber Making

In mills manufacturing fiber by treating paper with zinc chloride there is considerable use of corrosion resisting materials, especially for handling the zinc chloride and the paper after treatment. Evaporators for concentrating zinc chloride are usually built of acid resisting bronze and equipped with copper tubes. More recently, Monel has been used to re-tube such evaporators, since it has been found to be highly resistant to corrosion by zinc chloride, including both dilute and concentrated solutions.

Monel is being used also as a covering on cast iron 'making cylinders' or rolls which serve to squeeze excess zinc chloride out of the treated paper, and for drier rolls in fiber plants.

Wax Coating

Monel covered rolls have been found to be very satisfactory for the chilling of wax coated paper. Ordinary iron or steel rolls become corroded and pitted by condensed moisture and the resulting roughened surface not only mars the surface of the wax, but is not conducive to high heat transfer rates. It was found that by the use of a smooth Monel covered chilling roll it was possible to speed up the machine by one third. It is a well recognized fact that the faster the wax is chilled, the higher will be its gloss.

Fatty Acid Recovery

Several mills are recovering 'tall oil' (fatty acids) from black liquor. For the refining of the fatty acids by high temperature distillation, it is necessary to use highly corrosion resistant materials. Inconel has been found to be especially resistant to these fatty acids and has been adopted for such equipment as heater tubes, stills and entrainment separators. Pure nickel has been employed for the lining of heaters and stills in refining processes where an organic solvent is used. Investigators have found *(18)* that the stainless steel containing about 18 per cent chromium, 8 per cent nickel and 3 per cent molybdenum possesses useful resistance to corrosion by these fatty acids.

Ni-Resist and Monel are being used for 'tall oil' and fatty acid pumps.

Viscose Rayon Pulp Testing

Mills producing pulp to be used in the manufacture of viscose rayon commonly operate a small scale rayon plant by means of which they can test and control the quality of their product. In common with the largest viscose rayon plants, these small units make extensive use of nickel and nickel clad steel for the equipment in which the pulp is converted into viscose by treatment with caustic soda and carbon bisulphide and for handling the viscose solutions prior to their conversion into rayon fiber.

Condenser Tubes

Most steam turbines are equipped with condensers to handle whatever steam is not used for process heating. The tubes in these condensers are made of Muntz metal, yellow brass, Admiralty brass, red brass, aluminum brass or a copper nickel alloy containing 70 per cent copper and 30 per cent nickel. The last named alloy is used where the character of the water supply and the conditions of operation of the condenser are such that the more common brasses are not adequate.

Building Construction

Monel bolts and clips are employed as fastenings for corrugated asbestos roofing and siding which are coming into use in the construction of pulp mills, especially in the south.

Monel and stainless steel are being used for nameplates and identification tags on pulp and paper mill equipment.

Acknowledgment

The author wishes to acknowledge the assistance in preparing this paper given him by his associates, and especially Mr. T. E. Lagerstrom.

Literature Cited

(1) Cast Ferrous Alloys in the Paper Industry, *Tech. Assoc. Papers*, Series XIX, (June, 1936).
(2) Sulphite Mill Construction Materials—J. D. Miller, *Tech. Assoc. Papers*, Series XX, (June, 1937).
(3) Corrosion Resistant Steels in Sulphite Pulping—*Paper Mill*, (December 5, 1936).
(4) Report on Paper on Corrosion Problems of the Cellulose Industry presented at meeting of the Swedish Office of Chemical Industry—May, 1935, Torsell, C. O. *Ind.-Eng. Chem.*, News Edition, 13, (Dec., 1935), No. 23.
(5) Effect of Alkaline Liquors on Some Alloys—*Tech. Assoc. Papers*, Series XV, (1932).
(6) Report of Materials of Construction Committee, *Tech. Assoc. Papers*, XXII, (1939).
(7) Indirect Digester Heating Survey—Pell W. Foster Jr., *Tech. Assoc. Papers*, XXII, (1939).
(8) Copper Pipe Advantages in the Paper Industry—C. A. Hill and L. T. Summers, *Tech. Assoc. Papers*, Series XV, (1931).
(9) Discussion on Slime Troubles—Canadian Pulp & Paper Association Meeting, January, 1939.
(10) Stainless Steel for Pulp & Paper Mill Equipment—*Tech. Assoc. Papers*, XXII (1939).
(11) Beater and Jordan Development—B. W. Dean, *Paper Trade J.*, No. 19, 1934, pp. 39-40.
(12) Sprayed Molten Metal Coatings, *Tech. Assoc. Papers*, XXII (1939).
(13) Disc Refiner Design and Application—*Paper Trade J.*, March 24, 1938, p. 41.
(14) The Noblewood Mill—*Tech. Assoc. Papers*, XXII, (1939).

(15) Requirements of Materials for Weaving Fourdrinier Wires, H. E. Brown, *Wire Products*, January, 1936, p. 15.
(16) Some Factors Influencing the Life of Fourdrinier Wires—N. B. Pilling, F. L. La Que and F. G. Wheeler, *Paper Trade J.*, February 7, 1935.
(17) Monel Covered Rolls—C. G. Watson, *Paper Trade J.*, August 18, 1938, p. 34.

Supplementary References

Metals and Alloys in the Pulp and Paper Industry, J. D. Miller—*Metals Alloys*, December 1934, vol. 5, no. 12.
Stainless in the Paper Industry, J. C. Holding—*Paper Trade J.*, (Oct. 31, 1935).
Nickel Alloys in the Paper Making Industry, A. B. Everest—*Paper Maker*, (April 1935).
New Phases of the Fight Against Corrosion, G. A. Baker, *Paper Mill*, vol. 58, no. 12 (1935).
Copper and the Copper Alloy Metals, J. T. Kemp, *Paper Trade J.*, (Feb. 6, 1936).
Some Papermaking Equipment Observations, H. E. Weston, *Paper Trade J.*, (June 11, 1936).
Discussion of New Metals in the Pulp and Paper Industry, J. D. Miller, *Ind. Eng. Chem.*, vol. 28, no. 12, (December 1936).
Chemical Engineering in the Pulp and Paper Industry, T. L. Crossley, *Can. Chem. Met.*, vol. 21, no. 4, (April 1937).
Use of Metals in the Paper Making Industry, F. W. Tomlinson, *Worlds Paper Trade Rev.*, (April 2-23, 1937).
Improvements Incorporated in the latest and Largest Fourdrinier Kraft Liner Board Machine, R. S. Johnston, *Paper Trade J.*, (July 1, 1937).
Recent Improvements in Paper Machines, C. E. Macklem, *Paper Ind.*, (July 1938).
Stainless Alloy Welded Plate and Castings in Corrosion Resisting Pressure Equipment, R. Simpson, *Welding J.*, vol. 17, no. 7, (July 1938).

Bleaching of Kraft Pulp*

By Thomas W. Toovey[1]

Recently there has been increased interest in the manufacture of kraft pulps, especially in relation to kraft bleaching. Great strides have been made in bleaching kraft in the last few years and bleached kraft is being used in increased quantities for the manufacture of paper. The bleached kraft consumption in the United States has risen from one hundred thousand tons in 1933 to four hundred and fifteen thousand tons in 1938, while the production has risen from sixty-two thousand tons to three hundred and twenty thousand tons in the same period. The kraft development in the South has resulted in the installation of bleach plants of a large total tonnage in recent years and the contemplated program indicates a large increase in the near future.

Historical

It is interesting to consider the cause for this development. Kraft pulp has many excellent qualities which are useful in papermaking but until recent years it has not been possible to obtain a bleached product which would have the qualities of the unbleached pulp. Bleaching of soda and kraft pulps has engaged the attention of the industry almost as long as the manufacturing process itself. It is interesting to note that a patent was granted for the bleaching of soda pulp eighty-five years ago. A short resume of the American patent *(1)* granted to Charles Watt and Hugh Burgess in 1854 may be of interest. It states: "The wood is reduced to shavings, boiled in a solution of caustic alkali, washed and pressed and exposed to the action of chlorine or any composition of chlorine and oxygen, either gaseous or aqueous, washed and pressed again, using occasionally mechanical aid and then placed in a weak solution of caustic alkali when it will assume the form of a brown pulp. The latter is freed from alkali by washing and then bleached in the usual way."

Although the first kraft was produced in this country in 1909, the process was mentioned as having already been in existence in a textbook on the manufacture of paper written by Charles Thomas Davis and published in 1886. In this book, there are several interesting items with regard to bleaching. He mentions *(2)*, the advantages obtained by using more than one stage of bleaching and states that by bleaching in two stages, it is possible to obtain a much whiter and cleaner paper. Later on, *(3)* there is a diagram of a multistage bleach in the batch system with a cylinder washer between each bleaching stage. There is also mentioned a patent by a Frenchman, Jean B. Fessy which is, perhaps, the forerunner of the modern high density bleaching and indicates the possibilities of using a bleaching medium in a highly dispersed form as has been recently developed. *(4)*. Fessy bleached by the utilization of the decolorizing agents in a "nascent state." To attain this object, the bleaching is effected by submitting the materials to be bleached to the action of a solution or solutions of the decolorizing agents when in a state of "pulverization spray or fine dispersion." From this time until 1918 when a patent was issued to Drewson *(5)*, there seems to have been very little progress. It is possible that this inactivity was due to the lack of construction materials which are resistant to corrosion and to the mechanical difficulties of carrying out these processes. In recent years we have learned more and more of the chemical and physical reactions taking place during the cooking and bleaching and so we are able to overcome some of these difficulties.

Effect of Digestion

The recent paper given by Bixler *(6)* on "The Effect of Digestion on Wood Structure," opens up a very profitable field of research. Bixler's findings go a long way toward explaining some of the inherent difficulties of bleaching kraft. In studying the kraft and soda digestions, he states, "that attack on the intercellular material was nearly complete before any great visible attack was made on the secondary wall. Sulphite digestions do not follow this selective action on the 20 micron crosssections of spruce and the attack on the intercellular materials and secondary walls proceeded very nearly simultaneously." This observation is very interesting, inasmuch as it explains, perhaps, the difficulty of bleaching kraft to a high white without degradation of the cellulose fibers. Bixler mentions this degradation with the action of calcium hypochlorite as having a more drastic effect than chlorine followed by a sodium hydroxide wash.

In kraft we have not only the lignin to remove by bleaching, but also certain organic dyestuffs similar to phlobotannin. Holtzer *(7)* has investigated these materials and advises that the oxidation of these dyes makes them more difficult to remove and suggests two ways of avoiding their presence in the unbleached pulp. One is by overcooking the pulp. This gives a soft stock and reduces the yield. The second is to wash the pulp with dilute white liquor, which is an expensive process. The chlorination treatment of kraft renders the coloring matter soluble in caustic

* Presented at the Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Washington, D. C., June 13-15, 1939.
[1] Member TAPPI, Pulp and Paper Technologist Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

alkalies. The oxidized phlobotannins, after chlorination, are soluble in strong alkalies but not particularly soluble in solutions of alkline earth metals. Some figures given by Noll *(8)*, shown in the form of a graph Fig. 1, may be of interest here.

Consumption of Chlorine and Lignin Content

In Fig. 1, the consumption of chlorine and lignin content are plotted against the Roe chlorine number. These figures seem to bear out the conclusions arrived at by Bixler and Holtzer, inasmuch as, with increasing lignin content, the kraft pulp takes relatively more chlorine to bleach then the sulphite pulp. This may be due to both the chemical and physical properties of the pulp. In the lower ranges of lignin content, nämely, an overcooked kraft, the bleach consumption coincides with that of the bleached sulphite pulp. We can, therefore, assume that first, the dyestuff materials have been removed and second, that due to overcooking, the intercellular material has been removed and very likely an attack has been made on the fiber itself, thus, allowing the bleach to reach the secondary wall of the fiber more easily. This is accompanied, of course, with the loss in physical strength mentioned by Holtzer.

Strength and Color

It is obvious that in order to obtain a kraft of high strength and to maintain this strength during bleaching, a multistage system must be resorted to. It is apparent from Bixler's work that the majority of incrustants remaining in the kraft pulp lie between the primary and secondary walls. This being so, they must be removed without injuring the primary wall. The individual chemical treatments must, therefore, be mild and the removal of the products of reaction

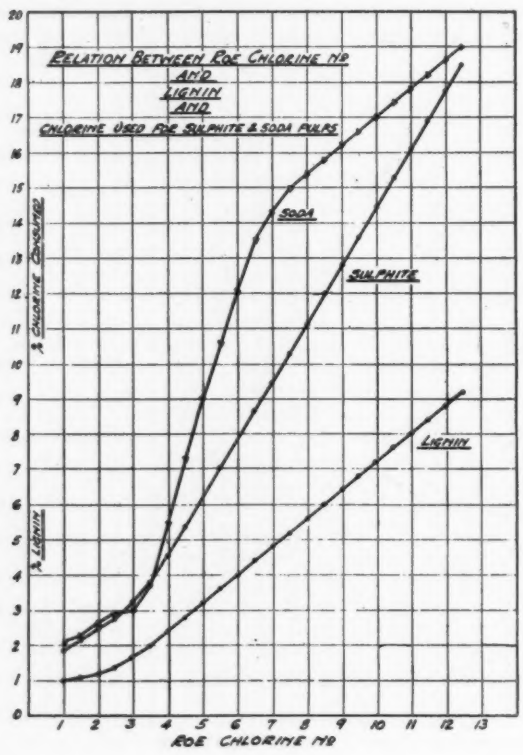


FIG. 1.

is important. If we consider the outer primary wall in the nature of a permeable membrane, we can see the logic of the recent European developments in washing. After chlorinating the pulp, part of the incrustants are dissolved and part are rendered alkali soluble. The dissolved incrustants are removed by washing in the acid state. This removes the acid formed in the chlorination. Treatment with alkali renders the remaining chlorinated material soluble but owing to the effect of the membrane, there is a time element in their removal. The latest practice, therefore, removes the alkali and some of the incrustants and then treats the pulp with water and allows the diffusion of the remaining products of reaction to take place through the membrane. After this diffusion period, the pulp is again washed and treated further. The number of stages used is limited by economic conditions, although a minimum of three stages is indicated for higher brightness values.

Color Reversion

Color reversion of the pulp is one of the drawbacks of bleached kraft. Since the majority of the incrustants present in the pulp are protected by this wall of cellulose, it is possible that although they may be bleached white, they have not been removed by the washing. These products tend to revert in color with age and heat. Some of the work done by Hamm *(9)* is of interest in this connection. He investigated the apparent difference of the color in a sheet which had been dried over the machine, to that air dried. The outer surface which had been in contact with the cylinders showed a darker color than the inside of the sheet. In investigating this by means of the ash content in terms of per cent sodium hydroxide on the stock, he found the following:

Inside of the machine dried material—0.52 per cent
Outside of the machine dried material—0.88 per cent
Outside and inside of air dried material—0.65 per cent

The above difference, he suggests, is due to the quick evaporation on the surface in contact with the drying cylinder causing a diffusion from the center towards the outer surface. This proves the necessity for not only good washing but for time to allow the diffusion to take place. In order to help this diffusion and to reduce the reversion of color, an acid treatment is used after the final stage of bleaching. Several investigators have proved that the acidified fibers wash better, probably because of the decreased swelling of the fiber in this state. Various acids are used for souring, but results obtained indicate that sulphurous acid is, perhaps, the best for this purpose.

Bleaching Systems

For purposes of discussion, the bleaching of kraft may be divided into three main groups:

Continuous systems
Semicontinuous systems
Batch systems.

The choice between the three systems is governed largely by the requirements of the individual plant. The flexibility of output, changing of grades, and chemical control are largely the influencing conditions. However, each production problem has its own solution as to whether a continuous, semicontinuous or batch system should be used. The number of stages which can be used may vary.

The main types in use in Europe are, as follows:

Three stages of chlorination and one of hypochlorite.

Two stages of chlorination and two hypochlorite.

One stage of chlorination and three hypochlorite.

One stage of chlorination and two hypochlorite.

Recently, however, there has been a revival of a system similar to that outlined in a patent granted to MacMillian in 1925 *(10)*. This method was, in effect, the pretreatment of the pulp with hypochlorite before chlorinating it. MacMillian used about 10 per cent of the chlorine demand as hypochlorite and chlorinated immediately, whereas, Sunneson *(11)*, whose patent was granted in 1938, pretreats with hypochlorite to the extent of 60 per cent of its chlorine demand, washes and then chlorinates.

The chlorination stages are generally followed by an alkaline treatment. This may take the form of neutralization or a definite alkaline treatment at higher temperatures. In order to effect good washing, there is often a diffusion wash stage added after the alkaline treatment. This is generally carried out at 3-3½ per cent consistency for three-quarters of an hour with a wash before and after. Sometimes the second alkaline treatment is carried out with sufficient excess alkali to enable the waste liquor from a screw press to be returned to the first alkali treatment. Another method which has been in use for some time is to defer the alkaline treatment until after the first hypochlorite stage.

Most of the kraft mills in Europe are manufacturing pulp for export. These pulps are generally sold by definite grades and this means that the mill is constantly producing grades of pulp under standard conditions. This situation lends itself to the use of a fully continuous type of bleaching. It is, perhaps, for this reason that continuous systems have made the greatest strides in European mills. In America, the situation is slightly different, the kraft mill is generally connected in some way with a paper mill and must supply various grades of bleached kraft from a semibleached pulp to a full white as the mill demands. Where such has been the case, the batch system has proved itself the most advantageous.

With the equipment available today, it is possible to install a bleaching plant in which the various stages may be adjusted to suit the individual conditions and properties of the pulp to be treated. In this way, a degree of flexibility can be attained which was not possible in the past.

Literature Cited

(1) U. S. Patent 11,343, July 1854.
(2) Manufacture of Paper—Charles Thomas Davis 1886—page 368.
(3) Ibid—page 373.
(4) Pennsylvania Salt Mfg. Co., U. S. Patent 1,971,341, April 1933.
(5) U. S. Patent, 1,283,113—1918.
(6) Bixler, A.L.M., *Paper Trade J.* 105, no. 27: 37-38 (Dec. 30, 1937).
(7) Holtzer, W. F., *Paper Trade J.* 99, no. 12: 91-103 (Sept. 20, 1934).
(8) Noll—*Papier Fabr.* 31, 1933, 595: 32, 1934, 157.
(9) Hamm—*Paper Trade J.* 76 (Nov. 16, 1923).
(10) U. S. Patent, 1,547,138—1925.
(11) U. S. Patents 2,083,280—1937 and 2,140,863—1938.

Efficient Water Removal With Rubber Covered Rolls*

By W. E. Brown [1]

Much information is available in one way or another relative to rubber covered rolls. It may be difficult to find any important matter regarding this subject which will be new to all. There are some angles from which I am not qualified to discuss this subject, but in the matter of rubber covered rolls I do feel competent to offer suggestions.

An article on this subject appeared in the *Paper Mill*, September, 1934. This article "Paper Machine Press Rolls" was evidently presented after considerable research work. The whole subject of water removal by mechanical means is fully dealt with in a clear, scientific manner. No one will dispute the fact that the cheapest way to remove water is by mechanical means. It is stated that in some mills the press cost to remove one ton of water is about 15c, while removal by evaporation costs nearer $1.60. It becomes quite evident then that maximum efficiency of the press part will result in more economical operation. It is further stated that the production of most machines is in many cases limited to the water removal ability of the press part.

* Presented at the Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Washington, D. C., June 13-15, 1939.
[1] Sales Mgr., Mechanical Roll Division, American Wringer Co., Inc., Woonsocket, R. I.

Construction of Rolls

The rubber covered roll, or any combination of a rubber roll with other types, is a very important part of this mechanical process of water removal. Rolls used to press water from the sheet should receive the serious consideration of the mill as to their body construction, walls and densities of rubber, crown, weighting, and condition of the rubber surface. Let us consider shell bodies. Too many times these are not properly made. Properly constructed roll bodies, made to withstand heavy pressure with the least possible deflection may cost you more than those of poorer construction, but will serve you far better in uniform water removal. A cheaper construction may deflect more easily, requiring a heavier crown to compensate for this deflection. This greater crown must be maintained to insure even water removal, thus requiring frequent regrindings and shorter life for your rubber cover. From the angle of rubber coverings alone it would pay to invest in the best constuction possible regardless of cost. With the better constructed roll body you would receive more satisfactory results all around.

Loss of Rigidity

Many of the press roll bodies now in use, especially

those on older machines have by their long use and frequent recoverings lost considerable in strength and rigidness. A large percentage of these could be replaced by the modern antideflecting type. By this means you would profit by the more efficient removal of water, and the need of the higher crown and its maintenance. Machine speeds, with heavier weighting, have further antiquated many press roll bodies. Your machinery builder can help you greatly in solving this problem. Call him in, and with him give serious consideration as to how to improve this condition. After all, mechanical means of water removal being the cheapest, the necessary attention to the details of an adequate shell body should be a prime consideration.

Crown of Rolls

Let us consider the matter of crowning. A crown is necessary due to deflection. It is used to overcome a natural mechanical defect. The least possible crown to meet your operating conditions is best, due to the fact that the larger it is, the more times must you resort to grinding to maintain it. How then do you determine the amount of crown and how do you apply it? No use of the slide rule alone, can determine this for you. Engineering facts and experience must be your guide. Each roll is a problem unto itself because all factors may vary from roll body to roll body. Having determined the proper crown, the application of that crown to your roll, as to its contour is most important. Just a crown, either taper or arc, will not do. In crowning paper mill rolls we use the formula furnished by either Farrell or Lobdell. These formulae are very nearly alike and differ only in minor details. By using this formula you are assured of as perfect a crown as engineering skill can devise. It will be a crown which should press evenly across the sheet and overcome any unsatisfactory extraction due to incorrect contour. We believe that many rolls are not ground with the correct crown contour. We urge that serious attention be given to this item. An adequate shell body with the minimum of crown and correct contour will aid materially in better water removal.

It has been stated on good authority that it is excellent practice to apportion the total crown on any press section to both the top and bottom rolls, proportional to their diameters. By this means it is argued, the surface of both top and bottom rolls will run at exactly the same speed at all points across the roll surface. It is claimed where the bottom roll carries all, or most of the crown that there is a surface slippage towards both ends, causing wear on the felts at these points as well as other adverse results. I have heard this discussed pro and con. I cannot argue the engineering theory of this, or from a practical papermaking point of view. I am simply offering this thought for what it may be worth to you.

Rubber Covering

Let us now consider the rubber covering itself. It is an accepted fact that the harder the rubber the more water will be removed with the same weighting. This is due to the concentration of pressure in a narrower nip area. Many factors modify the hardness or density best suited to your particular conditions. Felt life and crush are among these. Having determined the proper density, that gives a proper balance between felt life and water removal, and furnished on an adequate roll body, crowned with the proper crown contour, you are now equipped with a roll which should function in the best possible manner. To keep it so, do not neglect to regrind promptly when its condition requires it. Do not wait until your production or quality is affected by its poor condition.

Grinding

Many mills regrind at regular intervals. It is evident that if a roll requires .035 crown to extract water uniformally across the sheet, it will not do this as satisfactorily when this crown is lowered by wear. The re-establishment of crowns when necessary is very important. No doubt you do this but if you do not, it is recommended as good practice. You will take off very little each grinding. Your rubber cover will last longer between cover and recover than when you wait until it must be done to make satisfactory paper at all. If you wait, you will have to grind off more of the cover to recondition it. In settling on a proper density, if you have not already done so, call in your rubber roll engineer from whomever you buy your rubber coverings. In most cases he can help you on this and many other details of use and abuse.

Suction Rolls

The introduction of the suction press into many paper mills was delayed due to the tendency of bare bronze suction rolls to shadow mark. Rubber covering these rolls has made possible their use on all classes of paper. The rubber covered suction press has many advantages and there is one I would like to mention. This is the fact that the water removed, by the pressure in the nip is drawn out of the nip by the suction and does not feed through with the paper. This dam of water in the nip has always been a problem which the suction press takes care of nicely. Your sheet is hardened with less liability of breaks and with better water removal, thus permitting higher speeds. In operating rubber covered suction press rolls it is important to give serious attention to weighting. Pressure must be evenly applied and the crowns, if any, properly contoured. Do not overweight. The builders of these presses have set the safe operating pressures. Be careful not to over lubricate the bearings. Excess lubrication overflows into the interior of the shell body and works through the holes onto the rubber, causing damage.

Density

Plastometer

I would like to discuss here the matter of the density of your rubber cover as determined by the plastometer. There are other instruments used in measuring density, some good, some not so good. By density I mean the hardness or softness of the rubber. The standard instrument accepted by all rubber companies is the Pusey & Jones Plastometer. The readings taken with this instrument show the depression of a $\frac{1}{8}$ in. ball needle into the rubber surface under a kilogram weight, slowly lowered against the ball rod. The readings are in millimeters. The instrument is watch-like in its delicateness. It can easily be thrown out of adjustment and needs frequent checking. The makers of this instrument have a service in checking the plastometer, which is available to all. A master head is sent on request with which you can caliper your instrument. The

readings themselves show any delicate shadings in density far more accurately than most instruments for this purpose. A variation of five points on the plastometer would not show on some instruments. Bear this in mind when you try to check the roll you receive from the rubber company against what you ordered. You rarely can detect by any other means this five point variation.

PRECAUTIONS TO USE IN PLASTOMETER MEASUREMENTS

What affects the readings you take with a plastometer? First, the temperature of the rubber itself. All rubber is harder when cold. All rubber is softer when hot. The normal temperature for testing rubber for density should be, in my opinion, about 70 deg. F. It is not sufficient to let the roll remain in a room temperature of 70 deg. F. for a certain number of hours, unless it has brought the rubber temperature itself to 70 deg. F. If the roll has been in transit from the rubber company to the mill in very cold weather, the rubber will unquestionably be harder than when shipped. It will go back to normal when the rubber has warmed up to 70 deg. F. The same on the reverse. If shipped in very hot weather it will have softened. It will go back to normal when cooled to 70 deg. F. Another thing that affects the plastometer readings is the thickness of the rubber cover. A new rubber cover of 1 in. thickness, of exactly the same rubber compound, may test slightly softer than a ¾ in. or ½ in. thickness. Plastometer readings are affected somewhat by the depth of the cushion. In using the plastometer be sure it is in perfect mechanical condition and be careful how you operate it. When taking tests be sure that the dial is set at zero and do not allow the roll to be jarred in any way during your tests. When ordering rolls by plastometer give your rubber company the readings you desire. Do not say just "the same density now on roll." Many times rolls have hardened by age or have a greatly reduced wall of rubber due to wear causing a harder plastometer reading to be recorded. If you must refer to the old cover state, "same density as rubber was when it was new." That will give your rubber company some means of meeting your ideas. Many misunderstandings as to rubber densities could be avoided if you would help us to serve you.

Care of Rolls in Operation

Rubber rolls are many times abused in operation. With all that has been written and said on this subject one would believe this rarely possible, nevertheless it is true. We have for distribution booklets on this subject which are nonadvertising, and which are obtainable on request. It might be helpful if I mention at this time some of the items appearing in our service booklets. Weighting and adjustment of weights on your levers needs careful checking. I understand that even where the weights applied on levers are the same at both ends and in the same positions on the levers, the pressure exerted on the journals may not be equal. Several factors, mechanical in their origin, may affect the results. Care in removing the weights from both levers at the same time during breaks is important. If removed from one side and not the other, even for a short time it will likely damage a valuable rubber roll cover. Do not overweight. Rubber covers in general are a much better product today than in the past. They are made according to scientifically improved formulae, but there is a limit to the abuse they will stand and overweighting is a serious abuse. Rubber flexes under pressure, and the flexing if too severe will generate internal frictional heat. In the end we have fatigued rubber, which shows itself as deep or fine cracks on the roll surface, requiring heavy grinding. Under modern chemical control the resistance of rubber to fatigue has been greatly improved, but it is still possible to destroy or shorten its life by overweighting.

Kerosene oil which is used in some mills as a foam killer or for other purposes about a paper machine is a deadly enemy of rubber. So are all oils, but kerosene is the worst. Oil is cumulative in its action. Small amounts are absorbed by the rubber and this continues until the condition of the surface is badly deteriorated. If you must use kerosene wash your rubber roll at least once a week with strong soap and water and rinse thoroughly.

Store rolls where they will not freeze. Rubber freezes at the same temperature as water. Freezing will definitely injure rubber. Store in a cool, damp, dark place and keep away from heat.

Scott Breaks Ground for New Unit

A new $1,500,000 plant expansion program by the Scott Paper Company of Chester, Pa. including buildings, a new paper making machine with all necessary auxiliary and finishing equipment was announced last week by Edward S. Wagner, first vice president and treasurer of the company, on releasing the "Stockholder News" to shareholders of the company. "Ground has been broken for the building which will house the new paper making machine and it is hoped that the production unit can be placed in operation by the year-end," Mr. Wagner stated.

This is the third successive year in which Scott Paper Company has authorized an extensive plant expansion program. The first, begun in June, 1937, involved an expenditure of $1,700,000. The second, requiring an expenditure of over $2,800,000, was started in August, 1938 and came into production in February, 1939. The 1937 and 1939 additions to plant and production facilities increased the Company's potential paper making capacity about 40 per cent.

"Shipments of ScotTissue products during the past two months have reflected this increase in production, but orders booked during April and May still continued in excess of production and unfilled orders on file June 1, 1939 had increased to approximately 6½ weeks of maximum production. With the completion of the expansion program just authorized it is expected that the present enlarged producing capacity will be increased another 10 per cent," Mr. Wagner said.

Dismiss Petition Against Allied Mills

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 21, 1939.—The National Labor Relations Board has announced dismissal of the representation petition filed by the United Paper Mill Workers' Local Industrial Union 398, affiliated with the Congress of Industrial Organizations, in behalf of Allied Paper Mills, King Division, Kalamazoo, Mich., following secret ballot election held May 17, 1939, resulting in a count of 221 to 105 against the CIO union.

Steam Turbines for Paper Mill Application*

By K. S. Kramer[1]

In common with many other industrial plants, the paper mill requires relatively large quantities of energy in the form of heat as well as power. The initial source of virtually all of this required energy is the fuel burned in the steam generators. The steam thus generated serves as the medium for transferring the heat energy to turbines or engines for conversion to mechanical or electrical energy and to the digesters, drying rolls, etc., where the energy is required in the form of heat. Consequently the fuel cost per ton of paper produced is of particular importance to those who superintend the operation of the paper mills.

Considering it only as a thermo dynamic problem, the minimum fuel cost is obtained when the by-product power is a maximum. Suffice it to say that by by-product power, we refer to the power developed by the steam which is used in the various processes but is first passed through a prime mover which in turn acts as a reducing or controlling element as well as a power generating element converting some of the heat energy in the steam into mechanical or electrical energy. In this instance virtually all the heat energy in the steam is usefully employed. However where power is developed by a turbine exhausting into a condenser, the latent heat in the steam entering the condenser is absorbed by the circulating water from which it cannot normally be recovered.

Each paper mill has its own particular conditions and problems. The extent to which by-product power can be generated and the selection of the proper turbine application to serve this purpose in most instances involve careful and lengthy studies. The purpose of the present discussion is to present a fairly comprehensive picture of the various turbine types available for generating by-product power in varying degrees by briefly describing some turbines which have been applied in the paper industry. Details of turbine design will of course vary with the different turbine builders.

Drives for General Purpose Machinery

Starting with the smallest and simplest type, there is the single Curtis stage unit with a single governor valve controlled by a mechanical shaft governor. This turbine, alone or through a reduction gear, is used to drive all types of machinery, such as fans, blowers, pumps, etc. Such a unit with a reduction gear was furnished for the Piedmont plant of the West Virginia Pulp and Paper Company. This unit drives an induced draft fan and is rated at 600 hp. with inlet steam conditions of 550 lbs. ga. —725 deg. F. and exhausting at 25 lbs. ga.

An interesting application of this type drive was made in the plant of The Hinde & Dauch Paper Company of Gloucester City, N. J. Purchased steam at 60 lbs. ga. was being reduced to 5 lbs. ga. for the purpose of heating water for the beaters. On first thought a pressure reduction of this magnitude would not appear to offer any by-product power possibilities. However in this case a successful turbine application has been made. A 175 hp. turbine, operating with inlet conditions of 60 lbs. ga.—D. & S. and exhausting at 5 lbs. ga. is employed as a beater drive through a reduction gear. The same amount of water is still raised to the same temperature while the power is obtained for the beater drive with only a few per cent increase in total steam flow to make up for the heat removed from the steam by the turbine. Such an investment pays large dividends.

Ordinarily the driven apparatus of the type referred to does not require particularly close speed regulation or any wide range of operating speeds so that a simple mechanical shaft governor is entirely adequate.

Mechanical Drive for the Paper Machine

Now the same turbine can be used to drive the paper machine and all or part of the exhaust steam used in the drying rolls. However, for this application, a relatively close speed regulation is required over a wide range of operating speeds. By replacing the governor of the unit with a centrifugal weight transformer type, we have a turbine suitable for a paper machine drive.

A unit of this type was furnished to drive a paper machine in the mill of the Carolina Paper Board Company, Charlotte, N. C., for operation with steam conditions of 160 lbs. ga.—150 deg. F. supht., at inlet and 40 lbs. ga. exhaust, a rating of 125 hp. and for a speed range of 5 to 1. The exhaust steam is used in the driers and for heating water used in the beaters so that all power developed is by-product. An interesting and important item on this unit is the governor.

While the units so far for the paper machine drive have been single stage, single valve units, this application is not limited to this type turbine. The multi-stage-multi-valve units, a discussion of which follows, are also available for the same type of application.

Turbines for Electric Drive Applications

In using electricity as the driving force for operation of paper machines, direct current motors are invariably used because of their suitable operating characteristics. However considerable alternating current power is also used. This use of both A. C. and D. C. power permits in some cases of a very flexible arrangement so as to maintain a steam and load balance. This arrangement consists of a non-condensing turbine driving a direct current generator and an alternating current synchronous generator. The steam flowing through the turbine is always just that quantity required for process. Hence the power developed by the turbine is dependent upon and varies with the demand for process steam. When the power thus generated is in excess of the D. C. requirements, this excess power drives the A. C. generator which feeds into the A. C. system of the mill. When the power generated by the turbine is

* Presented at the Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Washington, D. C., June 13-15, 1939.

[1] Westinghouse Elec. & Mfg. Co., South Philadelphia Works.

not sufficient to satisfy the D. C. requirements, the A. C. generator performs as a motor feeding from the A. C. mill system and supplies the added power required to drive the D. C. generator to meet its requirements. The A. C. generator, being tied in with the mill A. C. supply, maintains the speed of the unit. A typical unit of this type was furnished for the Thilmany Pulp and Paper Company of Kaukana, Wis. The turbine has a nominal rating of 800 Kw with design conditions of 185 lbs. ga.—D & S at inlet, 35 lbs. ga. at exhaust and through a reduction gear drives a 300 Kw D. C. generator and a 500 Kw A. C. generator.

Another arrangement of electric drive is the sectional electric drive employing the starting generator system of control and providing carbon pile type voltage and section speed regulator. The sections of the paper machine are driven by individual D. C. motors through suitable gear reduction. Power for driving these sectional motors is furnished by the main turbine driven D. C. generator. A starting generator serves to "inch", "start" and "accelerate" the individual sections of the paper machine. In starting, each section motor is first connected to the inching generator, and when at operating speed, is transferred to the running generator. This system, in addition to completely removing the starting load from the main generator, provides great flexibility of control. A turbo-generator set was furnished for this type drive for the Crossett Lumber Company of Crossett, Ark. The turbine, which is a multi-stage —multi-governor valve unit, is rated at 600 Kw with design conditions of 140 lbs. ga.—D. & S. at inlet, 35 lbs. ga. at exhaust and through a reduction gear drives a 600 Kw D. C. generator and the "inching" generator.

Many paper mills have a power supply of alternating current and use conversion apparatus to supply the direct current for the paper machine motors. The Manchester Board and Paper Company of Richmond, Va., has installed a 750 Kw turbine driving a direct connected A. C. generator and designed for 400 lbs. ga.—100 deg. F. supht. at inlet and 30 lbs. ga. at exhaust. Power requirements in excess of this unit's output are supplied by the Utility Company. Since the frequency is maintained by the outside power supply, an exhaust pressure regulator controls the governing valves so that the power developed is entirely dependent on process requirements and is purely by-product power. The exhaust steam from the turbine is used in the driers and for water beating.

As previously mentioned many mills have a power supply of alternating current, requiring the use of conversion apparatus and driving the paper machines with large motors connected to the ordinary line shafting, rope or chain drive or with the sectional drive employing separate motors for the individual sections. In the larger mills and particularly where there is a combination pulp and paper mill, power requirement become quite high and consequently turbo-generator sets of relatively large capacity are employed. Typical of this is the Charleston, S. C., plant of the West Virginia Pulp and Paper Company. This mill has two 6,000 Kw A. C. units, both turbine drives designed for inlet conditions of 550 lbs. ga. and 700 deg. F. T.T. One drive extracts steam automatically at 150 lbs. ga. and exhausts at 35 lb. ga. while the other extracts steam automatically at 35 lb. ga. and exhausts to a condenser with 28 inches of vacuum. This combination of turbine types is common in paper mills as well as other types of industrial plants. The non-condensing extraction unit is entirely a by-product turbine while the condensing extraction turbine generates by-product power as well as maintaining a balance of power and steam requirements through the use of the condensing exhaust end. For turbines of this capacity where steam volumes are relatively large, the Curtis-reaction type turbine is employed.

The governing system is entirely of the hydraulic type. The governor consists of a single or double oil impeller depending on the specific requirements and mounted on the inlet end of the rotor. The speed responsiveness of this governor results from the fact that the changes in speed vary the impeller discharge pressure. The impeller furnishes high pressure oil for the operating mechanism of both the steam chest and extraction valves and also supplies motive oil for the ejector mounted on the reservoir. The ejector discharge is used to supply the bearings and the impeller suction. The impeller discharge connects into the housing of the main operating mechanism so that the relay within the operating piston moves in response to pressure changes and effects a change in piston position by controlling the oil pressure on the upper side of the piston. The impeller discharge is also connected to the relay of the extraction valve operating mechanism so that both main and extraction valves are similarly affected by changes in impeller discharge pressure. The pressure of the extracted steam, acting on the regulator diaphragm, controls two oil relief valves, one of which affects the relay of the extraction valve operating mechanism and the other the relay of the main operating mechanism. Changes in demands for extracted steam are reflected by changes in pressure of the extracted steam, which in turn, through the regulator, open or close the extraction valve and also the main governor valves so as to compensate for the change in amount of extracted steam, thereby maintaining a nearly constant frequency and extraction pressure for wide changes in load and steam demands.

Another type of turbine drive for similar application is the condensing double automatic extraction type. This is a 5,000 KVA unit installed in the plant of the New York and Pennsylvania Paper Company located at Lock Haven, Pa. The turbine is designed for inlet steam conditions of 175 lbs. ga. —100 deg. F. supht., exhaust of 28 inches vacuum and extracting automatically at 1 lb. ga. and 40 lbs. ga. The 40 lb. steam is used in evaporators and for some water heating while the 1 lb. steam is used for process and for feed water heating. Operating in parallel with this unit is another 5,000 KVA unit designed for operation with the same conditions except steam is extracted automatically at 15 lb. ga. for paper drying and non-automatically at 100 lb. ga. for use in the digesters. Most of the digester steam is furnished by the waste heat boilers, the additional required being supplied by the turbine.

Careful Study Should be Made

The foregoing is evidence of the fact that there is a large variety of turbine drives available for paper mill application and that a careful study should be made to select the type which will result

in the maximum by-product power consistent with other necessary considerations. Whether the mill is large or small, a new mill or an addition to an existing mill, a paper mill or a pulp and paper mill, the type of paper produced, all are some of the major factors which greatly influence the type of drive best suited for the application. In the quest for power cost reduction it should be borne in mind that there are numerous potential sources of by-product power some of which may not even be suspected of having such possibilities and which are illustrated by the previous reference to installation of a turbine utilizing a pressure drop of 60 lbs. to 5 lbs. In this same connection, there will be a trend towards higher pressures and temperatures as is evidenced by the West Virginia Pulp and Paper installation referred to. Some mills are also considering means of increasing the steam pressures and temperatures for their existing equipment. This can be done, in some cases by new boilers and revamping of existing turbines or where existing turbines cannot economically be changed, the result is obtained by installation of a topping unit. With turbines available in all manner of sizes and types from the single wheel unit to the double automatic extraction unit and for any steam pressure from 60 lbs. to 600 lbs. and higher, the paper industry is not hindered in this respect in making the most of by-product power with its attendant low power cost.

The Handling of Paper in the Government Printing Office*

By George Ortleb[1]

We rightly assume that your interest in your own paper products does not end when it has passed out of the doors of your mills, to be delivered to us in Washington.

Paper products do not attain their full value until put to their intended uses and one of the important steps along the way is obviously to get the paper to the job in the best possible condition for doing its work.

Let us then briefly describe to you the new Government Printing Office warehouse and its equipment, where we now receive and store your products under ideal conditions, and let us discuss some of the daily problems which arise in our handling of paper in order to bring it to the presses with the least possible delay and the greatest economy in avoiding waste from injury during transit. It is believed that a mutual understanding of paper shipping and handling problems will lead toward improvement and economy all along the line.

The Receiving Warehouse

The recently constructed warehouse is a three-story and basement building of reinforced concrete, 467 feet long and 87 feet wide. The load capacity of all floors is 500 pounds per square foot. There is a total net floor area of 129,139 square feet of which approximately 100,000 square feet are being used for storage purposes. Approximately 700 carloads of paper of 40,000 pounds each, making a total of 28,000,000 pounds, can be stored in the warehouse at one time. Quite often there are 14 carloads of paper waiting on the warehouse tracks at the same time.

The third floor of the building is on a level connected with the railroad tracks running into Union Station. On this floor there are two tracks on which may be placed a total of 16 freight cars at one time. Here is located air conditioning equipment for controlling the humidity and temperature in the Postal Card and Money Order Section of the Presswork Division, which is located on the second floor. The third floor also provides considerable storage space, and from it operates an automatic roll lowerator which serves to carry rolls of postal card stock, each weighing approximately 1,000 pounds, from the unloading platform to the postal card storage space near to the presses. These rolls are unloaded from the freight cars onto a receiving platform at floor level and, under their own momentum, roll into the lowerator, the door of which automatically closes. The lowerator then drops to the second floor, where the door opens automatically and the roll without assistance leaves it, and then it returns to the third floor for its next load. Each round trip of the lowerator requires approximately one minute of time, thus allowing the unloading of a 40,000 pound load of postal card stock and delivering it to storage on the second floor within 45 minutes.

The first floor of this building is devoted entirely to storage, with the exception of necessary space for truck shipping and receiving. The basement floor is used for storage of paper except for space occupied by power transformers, switchboard rooms, battery chargers, and other necessary building equipment. The warehouse is equipped with four freight elevators, each of 7,500 pounds capacity; and with two larger elevators, each of 15,000 pounds capacity, serving from the basement to all floors.

To connect this paper warehouse with the new building now being constructed at the corner of North Capitol and H Streets, N.W., there is an underground tunnel, the floor of which is 30 feet under North Capitol Street. The tunnel has two lanes allowing electric trucks and trailers to operate as frequently as necessary in both directions at once without interference.

With these ideal surroundings in which to handle paper stock there seems to be no reason why paper should suffer any injury on its way to the presses when the carloading, shipping, unloading and storing is properly done.

When it is taken into consideration that the quan-

* Presented at the Annual Meeting of the American Pulp and Paper Mills Superintendents Association, Washington, D. C., June 13-15, 1939.

[1] Deputy Public Printer, U. S. Government Printing Office, Washington, D. C.

tity of paper handled during the last fiscal year exceeded 83,000,000 pounds, the necessity of systematic, economical storage and transportation to the presses will be appreciated. With a view to reducing inestimable losses, wooden cases for paper shipments have been practically displaced by skids. Much loss occurred from shipments in wooden cases, from nail holes and the buckling of paper, caused by cases being shipped on end, as well as from dirty finger marks from the hands of laborers employed to unpack the cases. This method of packaging and handling not only effected in the first year a saving of over $28,000.00 but eliminated the daily work of thirty laborers.

Manner of Handling and Storing

Flat paper, now being received into the warehouse on skids, is unloaded from the freight cars by means of electric lift trucks which enter the cars, pick up the skids and carry them away to storage. The same method is used in unloading paper shipments arriving by motor truck. A receiving platform, level with the body height of motor trucks makes this convenient.

In the storage spaces the loaded skids are piled one on top of the other by means of high-lift electric trucks.

Paper rolls, except those of tabulating card stock, are stored on the side and piled about four tiers high by means of electric high-lift fork trucks. The rolls for postal card stock are piled in the same manner but a three-motor bridge crane is used for stacking them. Chains from the crane hook are attached to bars which pass through the cores of the rolls, making it possible for the crane to handle four rolls at one time.

Our experience has proven conclusively that there is much less damage done to roll paper when the rolls are handled on the side than when handled on end. This applies both to shipping them in the cars and to every handling they receive between the mill and the pressroom. We have found that whenever the nose of a stevedore truck is run under the end of a roll to transport it or to "break the roll over" from a standing position, there is more or less damage done to the edge of the roll, resulting in the loss of from one-eighth to one-half inch of paper.

For this reason we are not only storing all rolls of paper, with the exception of tabulating card stock, on their sides, but are requesting our contractors to ship them in this manner. When the new Printing Office Annex is completed and in operation, all rolls will be handled on the side from the cars to the pressroom.

Twelve trailers have been purchased to facilitate this work. Each one of these will carry three skids of paper weighing 2,500 pounds to the skid or two skids weighing 3,500 pounds each. These will be used in connection with electric tractors to haul paper from the new warehouse through the tunnel to the new building. These devices will almost entirely eliminate the use of stevedore and other hand trucks and all handling and hauling of stock will be done with power equipment.

Difficulties Encountered in Receiving

Since the plan of buying paper on skids instead of in boxes was initiated, it has been noted that the damage to flat paper from nail holes and buckling, caused by cases being shipped on end, has decreased by about 90 per cent.

During the last year our charges against the various mills for damage to stock in transit and extra labor involved have amounted to approximately $1,000.00. This figure would have been much larger except for the fact that in many cases where no material damage has occurred to the paper and a labor cost only was involved, we were content to absorb this expense with a caution to the contractor that subsequent shipments should show improvement. This figure did not include damage losses sustained by the paper but not detected until the skids have been opened for use, either at the time of issuing from the Stores Division or after reaching the pressroom.

One of the most frequent occurrences while in transit is the shifting of the load in the car. This may be attributed to either insufficient bracing of the load or rough handling of the car on the railroads, or a combination of both causes.

When steel strapping is used to anchor a skid load of paper to the sides of the car, the straps sometimes break through the wooden corner guards of the skids and cut into the paper, often ruining from 500 to 3,000 sheets.

When wooden timbers are used to brace a carload of skids it is not unusual, upon opening the car, to find that a piece of 2 in. x 6 in. or 2 in. x 8 in. timber has snapped off or has torn loose from its moorings and forced its way into a skid load of paper for a distance of from three to six inches. Even though the bracing may be very skillfully performed at the mill there are occasions when rough handling of the car on railroad sidings or in the yards has caused the paper to buckle or the load to shift position on the skid. This condition necessitates removal of the paper from the skid and reloading it before it can be placed in the storage tier.

Another frequent occurrence, when opening a car in our warehouse siding, is to discover that anywhere from one to ten skids have had the legs on one side broken off and are resting at an angle on the floor of the car. This type of injury generally occurs in what is known as a "floating load," that is with the skids strapped together by means of steel bands and no provision made to protect them from the rocking motion or side sway of the car in transit. The tendency of weak bracing or of a "floating load," having no anchor braces to the car sides, is for the load to shift from either end of the car toward the center door and form a jam there.

An infrequent, but possible source of trouble, which we might merely mention in passing is damage by water to the paper in transit. One carload of roll paper during the past year was damaged by rain water coming in under the car door, and one carload of binders board was wetted as the result of a leaky roof. The railroads assumed the responsibility of the damage in both of these cases.

Obstacles Encountered During Unloading

Our customary manner of unloading is to run a power lift truck through the car doorway and under the skid to lift and carry it to the elevator or to some convenient temporary position on the unloading platform. When the legs on one side of the skid has collapsed, it is impossible for the lift truck to get under the skid until it has been blocked up in some manner to a level position. When the skids have

jammed in the doorway the first few must be worked out by bars and by hand until sufficient space is opened for operation of the power trucks. The operation is slow and difficult because these skids must be placed with the legs or runners lengthwise on the trucks. This procedure consumes both extra time and labor and has at times added upwards of an hour and a half to our average unloading time of from twenty to thirty minutes per car.

Similar difficulties to those arising from insufficient bracing and shifting in the cars, are experienced when the car loading plan places all of the skids with their runners in one direction, crosswise of the car, so that a slight shifting of the load from end to end of the car, may break the legs and allow the skids to drop. Again, placing the skids which are nearest to the doorway lengthwise of the car and crowding them together necessitates their being turned about with hand bars before the lift trucks can reach them.

Specifications for Skids

In the Government Printing Office paper proposal, shipping instructions are given that the clearance under skids shall be ten inches and the clearance between runners not less than twenty-eight inches. These figures are based upon our power truck dimensions to permit their free operation in getting under the skid. This detail has at times been overlooked and some mills are inclined toward making the skids too large or loading them too high, although it is prescribed that the overall dimension shall not exceed forty-two inches in width, sixty-four inches in length and sixty inches in height.

May we here emphasize the importance of our specified proportions for loading skids in their relation to economy of receiving and storing the stock. Excessive height of the paper stack interferes with proper tiering of the skids and with hauling them in covered motor trucks for delivery to other Government Departments who purchase their paper through our office.

A skid which is built to exceed the specified width of forty-two inches presents difficulties in handling through our doorways, certain narrow aisles through which the trucks must pass in distributing the stocks throughout the plant and offers obstruction to storage in restricted spaces.

A maximum load limit of 3,500 pounds per skid has been prescribed with a view to preventing their collapse in addition to the other complications which we have here outlined. This load limit is sometimes exceeded by the mills and it is therefore brought to your attention as another important detail, which if followed, will contribute much to facilitate our work.

Roll Cores and Mountings

It has been our happy experience to find that the nonreturnable fiber cores with detachable metal plugs, are not only a satisfactory substitute for the three-inch iron cores, but there has been a decided decrease in the number of rolls which have had to be rewound for the pressroom because of damaged or bent cores. In this connection, it may be said that metal plugs are far superior to wooden plugs which have a tendency to split and slip out allowing the ends of the cores to collapse.

There has been only one difficulty experienced with nonreturnable cores and that can be easily eliminated with the cooperation of the mills. There has been a tendency to overlook cutting keyways into the cores before winding the paper. It is almost impossible to slot the core after it is in the roll, and the roll cannot be run on the presses without a keyway in the core unless we use expanding chucks.

Nonuniformity in Roll Dimensions

Another service that the paper mills can confer to assist our pressroom work and reduce our delays, is to give particular attention to uniformity in the diameters of rolls. For example, when 34-inch rolls are specified on the order, and the mill ships rolls measuring 37-inches, they will touch the floor when put on the press, and an inch or more of the paper will have to be cut down to allow sufficient clearance to run them. On the other hand, rolls which are less than 34-inches in diameter, naturally cause extra handling due to the fact that we have to run more rolls to complete a given job.

Lack of uniformity in the sizes of rolls also offers an obstacle to properly stacking them in storage. The undersized rolls do not give the proper support for the larger ones in the piles.

Nonuniformity in the winding of the paper on the roll occasionally necessitates our rewinding of the roll before sending it to the pressrooms.

Nonuniformity in Flat Paper Dimensions

Lack of uniformity in the thickness of flat paper has its effect upon handling operations. As an illustration of this, mimeograph paper may be mentioned. This must be cut and wrapped into packages for delivery to the various departments who purchase paper supplies through the Government Printing Office.

When several reams of mimeograph paper are placed side by side in the cutting machines, the pressure of the clamp on the thicker reams prevents sufficient pressure being applied to thinner reams beside them to hold the paper firmly while the knife cuts it. This affects the accuracy and neatness of cutting. When wrapped, the packages although containing the same required number of sheets, will not appear to be of the same bulk. This has lead several of the departments, to whom the paper is delivered, to complain on the natural conclusion that the thin packages do not contain the full count of sheets.

Considerable spoilage occurs in the case of flat papers which have not been cut to the exact dimensions specified on our orders. Let us cite an actual example of this. A certain governmental department ordered 50,000 sheets of bond paper cut to letterhead size of 8 in. x 10½ in. The paper issued to the cutter for this purpose, measured exactly 20½ in. x 32 in. instead of the specified 21 in. x 32 in. The cutter could get from this undersized sheet only seven letterheads to the sheet, instead of the usual eight; necessitating that 7,000 additional sheets be issued to complete this job. If paper for letterheads is found to measure 21 in. x 31½ in. instead of 21 in x 32 in. the loss becomes even greater, since the cutter can get only six to the sheet and we have to issue an additional 16,000 sheets without additional charge to the department ordering.

If flat paper is not cut perfectly square before delivery, it must be squared up before cutting to letterhead size, and the same condition which we have described above holds, that the trimmed sheets will not be of the proper dimensions to cut economically.

Shipping Paper Safely to Customers*

By William L. Ennis[1]

Abstract

Being a railroad man it has always been my thought that the first requisite in getting any commodity through to its destination was proper selection of the equipment to be used for the transportation of the commodity involved. Insofar as paper is concerned we have insisted that a positive inspection be made of each and every car to be used for this purpose—the inspection to determine that all protruding nails, etc., be removed—that the car has good sound floors, side walls and end walls, so as to insure proper nailing of bracing, blocking and other means of security. In addition we have emphasized the need for seeing to it that the car is weather and dirtproof, in other words that the roof does not leak and that the side doors fit sufficiently securely so as to minimize the amount of water or dirt entering the car in transit. Obviously, however, it is almost impossible and impracticable to maintain freight car equipment in such condition as to make the side doors fit securely at all times, therefore, it is necessary that these doors be battened so as to prevent the entrance of foreign matter enroute.

In attempting to tell you what is necessary to safely transport shipments of paper to the customer, it seems to me that I have been assigned a very large job and naturally with a limited amount of time available for presenting this paper, it will be necessary for me to touch on only some of the highlights.

Skids

Vibration

In the loading of paper on skids, it has been our experience that most of our trouble has been the result of failure of the skids to safely and properly carry through to destination and in analyzing several instances of damage, it seems to me that the failure of the skids was brought about principally due to the fact that they were constructed of a material that carried insufficient strength to withstand the terrific pressure brought about once the car started to move and vibration set in. In this connection many of our shippers do not appreciate just how vibration effects any commodity now that our freight trains are moving at a rate of speed much higher than it was a few years back, and because of that lack of knowledge are not taking adequate steps to so protect their commodity as to avoid damage from this particular cause. All of you at some time or other have had occasion to observe a freight train in motion and, I am sure, have observed the manner in which the cars are vibrating particularly when crossing other railroads, switches, frogs, etc. This action has a tendency to loosen up the package, as well as the blocking and bracing and many times when a car arrives at its destination in a damaged condition, the first thought is to state that the damage was due to rough handling. When, as a matter of fact, if we had had an opportunity of seeing the load before the car started to move, we would have discovered that the protective measures employed by the shipper were inadequate to protect against this type of damage.

Securing Paper on the Skid

Once we have constructed a skid of sufficient strength to carry the weight to be imposed upon it, then it becomes necessary that the securing of the paper on the skid, by means of metal strapping, etc., be carried through in such a manner as to keep the sheets from moving and thereby distorting the load on the individual skids and in turn distorting the entire load.

Loading Skids in the Cars

Skids should always be loaded lengthwise in the car and, if possible, in double rows, and each row of skids should be blocked or braced between the rows either by floor cleats at the sides or some sort of bracing material that will keep each row in line. Where the loads extend to a point in the vicinity of the doorpost either crib bracing or floor diagonals should be employed to keep each row intact and where the rows extend into the doorway and there is a minimum amount of space between the skids in the two ends of the car, that space should be taken up with cribbing so as to prevent the units in either end of the car shifting into the units in the opposite end of the car, thereby, not only eliminating the possibility of damage but makes it possible for the unloading forces to get into the car and remove the skids with a minimum of effort.

Floating Method

When the socalled "floating" method is employed, in other words each unit is banded together with metal strapping, the intent being that this will permit the loading to shift if the car is subjected to unusual handling, proper thought should be given to the type of strapping to be employed, so that there will be no failure in transit permitting the individual units to break up and thereby create a situation liable to cause damage. It has been our experience in employing this method of loading that at least two metal bands or four wire ties should be employed; further, the metal bands should be of steel, at least 1¼ in. wide, 20 gauge, with a tensile strength of not less than 4000 lb. per band. If wire is employed, same should be 8 gauge, with a tensile strength of not less than 2000 lb. per strand, and the wire should be installed in such a manner that two of the wires are placed near the top of the load and two near the bottom. It must be further understood that in applying metal strapping or wire ties that equal tension on each tie is of the utmost importance. We all understand, in this connection, the need for employing adequate corner protection to each skid contacting the strapping so as to eliminate the possibilities of the strapping or wires causing damage to the commodity.

Loading Rolls in the Cars

In the loading of newsprint paper in rolls, it has always been our belief that the proper method to be employed was to stow the rolls on end, staggering the rolls in such a manner as to permit them to nest in the car and endeavoring to use a car that leaves as

* Presented at the Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Washington, D. C., June 13-15, 1939.

[1] Manager, Claim Prevention Department, Chicago, Milwaukee, St. Paul and Pacific Railroad Company, Chicago, Illinois.

little space as possible between the rolls and the side walls of the car. In stowing the rolls every effort should be made to do a good, tight job so as to reduce the opportunities for the rolls moving about when vibration sets in and thereby creating a condition liable to cause chafing, rubbing, etc.

Our experience in some instances during the past few years shows that there is a tendency on the part of some receivers of such paper to cut down on the amount of protection, particularly that employed in the caps, the result being that damage has been experienced which we felt could have been avoided if additional protection had been afforded the ends of the rolls.

FLOATING METHOD

In loading this type of paper the socalled floating method has worked out to the best advantage. Here again, however, proper thought must be given to the type of protection to be afforded. In order words if metal strapping is employed, the strap should be of the proper gauge and tensile strength to properly protect the weight of the unit which it is holding, and the same thing holds true in the case of wire.

FLAT LOADING

Another situation which seems to have developed quite fast during the past few years is the desire of certain consignees of this class of paper that same be loaded flat on the car floor and while we have felt that this particular type of loading was not entirely proper considering the commodity involved, naturally desiring that our customers be kept satisfied, we have spent a great deal of time and effort in working with the shippers and receivers in instances where damage was being reported, giving them the benefit of our experience as to just what we felt could and should be done to minimize the opportunity for damage in this type of loading. One of the most serious difficulties has been the action of the rolls on the top tiers turning in transit, this action, naturally, causing a rubbing and chafing through the wrapper and creating damage to the paper itself. In order to overcome this particular situation, metal strapping has been employed at each end of the unit and a sufficient amount of protection has been placed between the strap and the wrapper to permit some play on the part of the rolls but at the same time to avoid damage to the paper in the individual rolls. It was also found that some of the shippers were not stowing the rolls in the various units in a uniform line; and in other cases a space existed between the side rolls and the side blocking, this permitting the rolls to shift against the blocking and caused damage.

Railroads Problem

I trust you have not reached the conclusion, from what I have to say, that we feel the entire responsibility for the safe and proper transportation of shipments of paper rests entirely with the shipper, as we do appreciate the fact that we have our own responsibility insofar as the furnishing of proper equipment is concerned and the proper transporting of the car from its point of origin to its destination. We are not unmindful that a certain amount of damage does occur, due to socalled rough switching and with that in mind are waging a campaign constantly with our train, engine and yard forces with the one idea of educating them to the fact that they cannot continue to improperly switch cars without creating damage and worse yet without creating dissatisfaction on the part of our patrons.

CAREFUL HANDLING COMMITTEE

In order to bring this home to such employes, we have organized in all of our terminals what are known as "Careful Handling Committees", the membership of which consists of the Terminal Trainmaster or Yardmaster, an Engineer, a Switchman, a Foreman, a Car man, Section Foreman, and sometimes one or two other employes. These committees meet monthly, go over reports of bad handling in their respective terminals and make suggestions and constructive criticisms with the view to eliminating, or at least minimizing, the amount of trouble in not only their own yard but over the system at large. Furthermore, the company owns and operates better than 60 impact recorders, these machines being kept moving constantly with the one idea of determining just where rough handling is occurring. The results of these tests are promptly and thoroughly analyzed and where rough handling has occurred, either on our own rails or the rails of our connections, immediate action is taken with the crew or crews involved with the view to avoiding a repetition on our own railroads. Our superintendents maintain a positive record of these reports and where any one Foreman or Engineer is charged with an excessive number of rough handling shocks, disciplinary action is taken.

Responsibility of the Unloaders

It seems to me I would not be fair, however, if I failed to comment on the responsibility of the unloading forces. It has been our observation in watching cars unloaded to find in many instances that the unloading forces do not appreciate the need for careful handling and I feel that in many instances, this is due to the fact that the unloading is accomplished by contract truckers who actually are doing the job with a minimum of time and expense, in order that their return will be as large as possible. They probably do not appreciate just what rough or careless handling means in the way of dissatisfaction as well as unnecesary effort and expense on the part of the ultimate consignee, and it has been our reaction when we run up against an incident of this kind to stop and explain to the unloading forces just what these fellows can do to assist in minimizing damage, whether it is paper or any other commodity.

What I have tried to convey to you this evening is the fact that the elimination of damage to paper as well as to any other commodity, is not a one-man job, but requires the cooperation of everyone concerned, starting right at the time the article is manufactured, seeing it placed in its container, then loaded into the car, properly transported from the point of origin to destination, properly unloaded from the car, and then properly placed in position for ultimate use, in other words removed from the container in which it traveled. Naturally, loss and damage to freight represents an economic waste to the country at large, as well as to the various individuals most directly concerned, and in these days of spirited competition for business of all kinds, none of us wants to contribute in any manner whatsoever towards creating a "dissatisfied customer," therefore, I am sure that by continuing the fine spirit of cooperation which has existed between the paper industry and the transportation business, we will continue to reduce and I hope eventually eliminate damage to all types of paper.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Tonawanda, N. Y.—The Spaulding Fibre Company, Wheeler street, manufacturer of fiber tubing, rods and other fiber products, has plans under way for new addition to plant, to be two-story, about 60 x 100 feet, reported to cost close to $50,000, with equipment. It is proposed to ask bids on general contract at early date.

Boston, Mass.—Tileston & Hollingsworth, 213 Congress street, manufacturers of bond and other writing paper stocks, have filed plans for alterations in local mill at 892 River street, and will place work under way at once. No estimate of cost announced.

Charlotte, N. C.—The Carolina Ruling and Binding Company, East Fourth street, manufacturer of paper specialties, has plans under way for construction of new plant on local site on West Vance street, consisting of a one-story structure, reported to cost over $25,000, with equipment. It will provide for considerable increase in present plant, which will be removed to new location and additional equipment provided. J. R. Madagan is president.

Manitowoc, Wis.—The Kieckhefer Container Company, 1715 West Canal street, Milwaukee, Wis., manufacturer of corrugated boxes and containers, has completed foundations for new mill on South 18th street, near Dewey street, Manitowoc, previously referred to in these columns, and will proceed with superstructure at once. New mill has been laid out in T-shape, 120 x 240 feet, to be equipped for general production, with storage and distributing building adjoining, to be one-story, 80 x 360 feet. Work will also include a boiler house, 40 x 40 feet, and an office structure, 40 x 45 feet. Entire plant will approximate 70,000 square feet of floor space. Contracts are being awarded for different branches of construction, including roofing, reinforcing steel for concrete walls, structural steel, millwork, heating, etc. The Hamann Construction Company, North Eighth and Reed streets, Manitowoc, is general contractor. Entire plant is reported to cost approximately $150,000, including equipment, which will provide for large output.

Tampa, Fla.—The International Paper Company, 220 East 42nd street, New York, N. Y., has arranged with the Union Terminal Company, Tampa, for construction of a building in the Estuary district for the storage of newsprint, to be operated by the last noted organization for the International company. It will be one-story, 200 x 200 feet. No estimate of cost has been announced. Erection contract has been let to Albert Haworth, 628 Raymond avenue, Tampa, and work is scheduled to begin at once.

Cleveland, Ohio—The William A. Howe Company, 1625 East 31st street, operating a plant for general finishing of paper products for the lithographing and printing trades, including gumming, varnishing, lacquering, etc., has plans under way for new addition to plant, to be one-story, reported to cost close to $25,000, including equipment. It is proposed to ask bids on general contract at early date. Julius Boenisch, Finance Building, Cleveland, is architect. E. W. Rentener is president.

Cincinnati, Ohio—The United States Printing and Lithographing Company, Robertson road and Beech street, Norwood, manufacturer of folding paper boxes and containers, has work under way on one-story plant unit to replace portion of factory recently damaged by fire, and will have the structure ready for occupancy at early date. Edward A. McCarthy & Son, 1212 Race street, Cincinnati, are general contractors for work.

Marrero, La.—The Celotex Corporation has increased production schedule at its mill at Marrero for the manufacture of celotex board specialties, and will hold to new basis of output for an indefinite period. Shipments from the mill during May were 31 per cent over those for the preceding month of April, and about 46 per cent in excess of those for May 1938.

Clarence Center, N. Y.—The National Gypsum Company, 190 Delaware avenue, Buffalo, N. Y., manufacturer of wall board, insulating material and allied products, has awarded general contract to the Metzger Construction Company, 429 Carlton street, Buffalo, for new addition to branch mill at Clarence Center, recently referred to in these columns. It will be two-story and basement, 50 x 62 feet, reported to cost close to $45,000, with equipment. Erection is scheduled to be placed under way at once.

Toronto, Ont.—Cutting, Ltd., 364-70 Richmond street, West, manufacturer of paper rolls for automatic machines, and kindred paper products, has approved plans for expansion at plant, to include installation of additional machinery for the production of other paper and allied specialties. A new line of drinking straws will be produced in addition to other paper goods.

Maryvale, Australia—The Australian Paper Manufacturers, Melbourne, Victoria, are completing construction of a new pulp and paper mill

at Maryvale, Victoria, and will place the plant in service during the summer. The paper-making division is being equipped to produce paper 180 inches in width, with pulp department designed for a maximum output of 90 tons per day. Initial operations will be on a basis of about one-half this amount, to be stepped-up to capacity schedule in the fall.

New Companies, Etc.

New York, N. Y.—Color-Kraft, Inc., has been organized with capital of $10,000, to deal in paper products of various kinds. New company is represented by Mudge, Stern, Williams & Tucker, 20 Pine street, New York, attorneys.

Boston, Mass.—The Leigh Paper Products, 206 Boston street, has filed notice of organization to deal in paper goods of various kinds. Company is headed by Leo A. Fandrey, 4 Roslin street, Dorchester, Boston.

Detroit, Mich.—The Nashua Gummed & Coated Paper Company, Franklin street, Nashua, N. H., manufacturer of special papers, gummed stocks, etc., a Massachusetts corporation, has filed notice to operate in Michigan, with capital of 61,000 shares of stock, no par value, and $501,400. Local corporate representative is Reginald K. Leavey, National Bank Building, Detroit.

St. Louis, Mo.—The Gaylord Container Corporation, 2820 South Eleventh street, manufacturer of corrugated boxes and containers, has filed registration of 10,000 shares of preferred stock and 80,000 shares of common stock, the proceeds to be used for property acquisition and working capital.

Joseph Godwin Dead

Joseph Godwin, 67, of 800 Ocean Avenue, Brooklyn, N. Y., a member of the wholesale paper and pulp firm of Bulkley Dunton & Company of 295 Madison Avenue, New York, died June 12 in the Murray Hill Hospital, after a short illness. He was stricken in his office two weeks ago.

Mr. Godwin had been actively associated with his concern for 53 years and was widely known in the paper trade. A native of New York City, he lived in Brooklyn for 40 years. He is survived by his widow, Carrie; a daughter, Mrs. Ethel M. Haas; a son, Walter, and two sisters, Miss Mabel Godwin and Mrs. Florence Martin.

Services were held in the Fairchild Chapel and burial was private.

Urges More Mills for Georgia

ATLANTA, Ga., June 19, 1939.—Establishment of four additional paper mills in Georgia to absorb surplus pulpwood in the state is recommended by G. F. Grant, professor of forest utilization at the University of Georgia, in a report to Chancellor S. V. Sanford.

Urging the proposed mills to be financed by residents of the state, Mr. Grant pointed out that little benefit is being derived by land-owners in the Piedmont and western parts of the state from the mills at Savannah and Brunswick and that Georgia, with an abundance of fast growing pines, could adequately supply the additional mills.

Quaker City Improves Quarters

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., June 19, 1939—The headquarters of Quaker City Paper Company, with their warehouse at 303 Vine street, has been completely renovated. With the addition of 5,000 square feet, the office personnel enjoys very commodious quarters, equipped with new furniture, fixtures, etc., that are second to none in this city. Manager of the fine department, A. R. Williams, and his sales force occupy spacious offices adjacent to an expansive section which comprises the clerical and order departments, while in an adjoining office, W. B. Killhour, treasurer, and the bookkeeping departments hold forth. The office of president W. B. Killhour comes next, following which is that of vice-president Howard W. Lee. The office of secretary Robert S. Reed, in charge of coarse papers, with splendid facilities for the salesmen of that division, complete the "L" shaped layout. The stock room has also undergone extensive alterations including the re-alignment of new shelving, conducive to greater efficiency in this department.

Paper Mills Favor Improvement

[FROM OUR REGULAR CORRESPONDENT]

CAPE VINCENT, N. Y., June 19, 1939—It is reported here that the Federal government is partially favorable to the harbor improvement as suggested by army engineers following a recent survey. A hearing on the proposition was held here last fall at which many prominent paper mills in this section were represented. In that part of the harbor extending downstream several hundred feet from the dock of the St. Regis Paper Company the engineers recommend that the deepening be to a depth of twenty feet. The paper company claims that deepening the harbor will allow it to use the local terminal for shipments of large pulpwood supplies.

G. H. Wood Heads River Raisin

George H. Wood was re-elected president and general manager of the River Raisin Paper at Monroe, Mich. following the annual meeting of the stockholders and directors.

Other officers elected were: J. Frank Gray and Charles Wood, vice presidents; J. W. Walter, secretary-treasurer, and Miss Hilda Ohr, assistant secretary. The four officers and Howard O'Brien, Grand Rapids, Mich., and B. K. Walter, Monroe, form the board of directors.

Approximately 70 per cent of the stock of the company was represented at annual meeting.

The company has branch plants at Cleveland and Washington, Pa. It has about 900 persons on its pay roll, the peak number having been 1,300.

Fort Wayne Paper Co. Moves Office

[FROM OUR REGULAR CORRESPONDENT]

FORT WAYNE, Ind., June 19, 1939—The Fort Wayne Corrugated Paper Company will move into the west wing of the former Western Gas building here about July 1. The company has completed a lease and alterations are being made. The factory is at Hartford City, Ind., and the new quarters will provide offices and warehouse space.

Financial News of Pulp and Paper Industry

Price Brothers' Annual Report Shows Decreased Net Earnings — Lower Net Profit Reported By Celotex Corporation—Masonite Corporation Declares Dividends of $1.25 On Preferred and 25 Cents On Common Stocks.

New York Stock Exchange

High, Low and Last for the Week Ending June 21, 1939

	High	Low	Last
Armstrong Cork Co.	40	38½	39½
Celotex Corp.	12⅜	11¼	12¼
Celotex Corp., pf.	66	64	66
Certain-Teed Products Corp.	8⅛	7¼	8⅛
Certain-Teed Products Corp., pf.	30½	27	30
Champion Paper & Fibre Co.	20	18¾	19
Champion Paper & Fibre Co., pf.	98¼	98	98
Congoleum-Nairn Co.	23½	22½	23½
Container Corp. of America	10⅞	10⅛	10⅜
Continental-Diamond Fibre Co.	7	6⅝	6⅝
Crown-Zellerbach Co.	10¼	9⅞	10¼
Crown-Zellerbach Co., pf.	80	80	80
Flintkote Co.	21⅛	20⅜	20¾
Robert Gair	2¼	2⅛	2⅛
Robert Gair, pf.	8½	8⅜	8⅜
International Paper & Power	8⅝	8	8¼
International Paper & Power, pf.	32⅝	30½	31⅞
Johns-Manville Corp.	75½	70	75½
Johns-Manville Corp., pf.	130½	130	130
Kimberly Clark Corp.	26½	24½	25
MacAndrews & Forbes	30¼	29½	30¼
Masonite Corp.	40½	39	40½
Mead Corp.	8¼	8	8¼
Mead Corp., pf.	60	58	60
Paraffine Companies, Inc.	46⅜	46	46⅜
Paraffine Companies, Inc., pf.	102¼	102	102
Rubberoid Co.	22	20¾	21½
Scott Paper Co.	51½	50⅝	51½
Scott Paper Co., pf.	117	116	116¼
Sutherland Paper Co.	28⅛	28	28
Union Bag & Paper Corp.	8½	7¾	8½
United Paperboard Co.	4⅝	4⅜	4⅜
U. S. Gypsum Co.	93	91	92½

New York Curb Exchange

High, Low and Last for the Week Ending June 21, 1939

	High	Low	Last
American Box Board Co.	6⅛	5⅞	5⅞
Great Northern Paper	35¾	35¾	35¾
St. Regis Paper Co.	2⅛	2	2
Taggart Corp.	3	3	3

Price Bros. Earns $1,886,920

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., June 19, 1939—The annual report of Price Brothers and Company, Limited, for the fiscal year ending March 31 last shows an operating profit of $1,886,920, as compared with $2,678,542 in the preceding year. Other income amounted to $205,862 against $205,471, making total income of $2,092,782 against $2,884,013. After deducting bank, bond and debenture interest, and providing $820,000 for depreciation against $1,000,000 in the preceding year, and $20,000 for depletion against $250,000, there was a balance of $3,577 against $600,228. The balance of $3,577 was added to previous earned surplus of $500,229, making a total of $503,806 carried forward.

The president, Col. C. H. L. Jones, in his report states that on March 31, 1939, marketable securities, carried at book value since reorganization, were written down to prevailing market quotations on that day. An adjustment of $737,310 was made to capital surplus in respect thereof.

As a result, and after deducting $38,458 net loss on securities, and adding a distribution of $100,616 received from Quebec Investment Co., and $6,180 from Newsprint Institute of Canada, capital surplus was carried forward at $7,541,660 against $8,210,633 last year.

Balance sheet shows net working capital of $7,259,357 against $7,810,472, a decrease of $551,000. During the year, funded debt was reduced by $500,000 due to maturity of $500,000 of first mortgage bonds on March 1, 1939. Writing down of the marketable securities by $737,310 also represented a reduction in current assets. Banks loans were reduced to $3,675,000 from $5,150,000.

The auditors' report states: "Included in the current assets is an amount of $633,714 due by Hearst Companies of which $583,551 is represented by notes and $50,163 by open accounts receivable. This indebtedness is, in the opinion of counsel, secured jointly with others under certain indentures of pledge of various Hearst's assets. We are not in a position to express an opinion as to the ultimate value of this indebtedness."

The annual meeting of the company is to be held in Quebec on June 29. One of the proposed new by-laws to be submitted for approval provides that the fiscal year of the company shall end December 31; another that the board shall consist of eleven directors (there are now ten).

Celotex Corp. Nets $10,399

The Celotex Corporation, manufacturer of insulation products, reported today for the six months ended on April 30 a net profit of $10,399 after all charges, compared with $117,531 for the like period a year before. The previous figure, the company said, included "a substantial amount of non-operating income not realized in the current figure." Net profit for the three months ended on April 30 was $22,535, compared with $109,128 a year before. O. S. Mansell, vice president, said sales in May were 40 per cent larger than in the same month last year.

Masonite Declares $1.25 Dividend

[FROM OUR REGULAR CORRESPONDENT]

WAUSAU, Wis., June 19, 1939—Directors of the Masonite Corporation, with mills at Laurel, Miss., declared regular quarterly dividends of $1.25 per share on the outstanding preferred stock, and 25 cents a share on common stock, at a meeting June 14. The preferred dividend will be paid September 1 to stockholders of record August 20, and the common dividend September 10 to stockholders of record August 20.

N. E. Fine Paper Merchants Meet

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., June 19, 1939—At the meeting of the Fine Paper Division of the New England Paper Merchants held at the Boston Chamber of Commerce June 8 a group of fine paper and dual members of the association decided to make application for membership in the Graphic Arts Institute, Inc.

Salesmen's Study Course Concludes Program

Appropriate Exercises End Annual Program of Salesmen's Study Course Under Auspices of Paper Trade Association of Philadelphia At Franklin Institute—W. F. Killhour In Paper Trade 57 Years—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., June 19, 1939—With appropriate exercises, the Paper Salesmen's Study Course under the auspices of the Paper Trade Association of Philadelphia, concluded its program at the Franklin Institute on Tuesday last. F. H. Denham, technical director, R. C. Vanderbilt Paper Division of the DuPont Paper Company, who is considered an outstanding authority in this country on the subject of opaque pigment, discussed the development of the use of opaque pigment in paper and the methods of merchandising and selling of papers of this nature, after which F. H. Doscher of Lily Tulip Cup Corporation, conducted a forum among the students.

W. F. Killhour in Paper Trade 57 Years

William F. Killhour, treasurer of the Quaker City Paper Company, and father of William B. Killhour, president of Quaker City and the Paper Trade Association of Philadelphia, merits the enviable distinction of Dean of Paper Merchants. For 57 years Mr. Kilhour has been continually engaged in the paper business, previous to which he had been engaged in farming, having been born on a farm in Frankford, Pa., and even today takes quite an active interest in all things horticultural. After his education in a country schoolhouse, his first job was on the farm of Joseph G. Ditman, then located at Bridge and Jackson streets, Frankford. When he attained his 16th year, Mr. Killhour resigned his position on the farm and went to work with the paper house of Joseph G. Ditman & Company, at 32-34 South Sixth street. While serving his apprenticeship he learned the correct handling, storage, wrapping and shipping of a wide variety of paper stocks, and it was not long before he won acclaim among the outstanding paper men and printers of that day. In 1884 the Ditman Company was purchased by A. G. Elliott & Company, and Mr. Killhour continued with that company until March, 1905, when he together with Joseph B. Mitchell, founded the Quaker City Paper Company at the southeast corner of Sixth and Commerce streets. For about 20 years, the Quaker City Paper Company remained at Sixth and Commerce streets, enjoying prosperity and expansion each year. Meantime, William B. Killhour, son of W. F., became associated with the company and soon became president. In 1925 the company moved to 70 and 72 North Second street, but because of the steadily increasing business, was obliged to acquire larger quarters, and June, 1928, found it established in its present large and commodious building at 303-311 Vine street.

Garrett-Buchanan Co.'s Steady Growth

The Garrett-Buchanan Company, 12 to 20 South Sixth street, has enjoyed a steady growth during their sixty-six years in the paper industry. They first acquired the Van Reed Paper Company of Reading, Pa., later the Charles W. Beers Company, Baltimore, Md. This company continued to trade under the name of the former owner in Baltimore for many years until today it is known as Garrett-Buchanan Company, 7-9 East Lombard street.

The most recent step of this well known company was to buy a building on the northeast corner of 8th and Willow streets, Phila., to be used as a warehouse; this 4-story brick building is 88 feet by 133 feet, has a railroad siding and is now being equipped with new elevators.

F. H. Seltzer, vice-president and assistant manager of Garrett-Buchanan Company, announces their appointment as agent for Armada Cover,—Jungle Cover,—Mould Made Cover, and Currency Cover. A new loose leaf price list is just off the press which places their large diversified lines up-to-date.

Scott Paper to Spend $1,500,000

Edward S. Wagner, first vice-president of the Scott Paper Company, announces a $1,500,000 expansion of the company plant, which will include a new papermaking machine with all necessary auxiliary and finishing equipment. Ground has been broken for the building, which is expected to be in use by January 1, 1940.

Southland to Use Champion Pulp

The Southland Paper Mills, Inc., which is erecting a newsprint mill at Lufkin, Tex., has contracted with the Champion Paper and Fiber Company to supply the chemical pulp required for the manufacture of newsprint. The Southland mill will have an annual capacity of 50,000 tons of newsprint. Although original plans included a sulphate pulp mill, the Southland company state that the smallest plant that could be erected would supply a larger tonnage of pulp than present plans require, and that a large saving in the initial cost of the plant will be effected by the contract with the Champion company to supply the sulphate pulp.

According to a representative of the company, all the steel work is now up in the drying and machine rooms and these units are now under roof. Work on the steel framework of the groundwood unit is expected to start on June 20, and the plant is expected to be in operation by February 1940.

SAPI Golf Outing

The first golf outing of the Eastern division of the Salesmen's Association of the Paper Industry, will be held at the Nassau Country Club, Glen Cove, L. I., N. Y. on Wednesday, June 28. Play will start at 1:30 P. M. The price of $6 covers all green fees, a fine dinner and numerous prizes. Early reservations are requested by the Golf Committee and should be sent to E. R. Lyman, Missisquoi Corporation, 41 Park Row, New York.

WYCKOFF

Since 1855

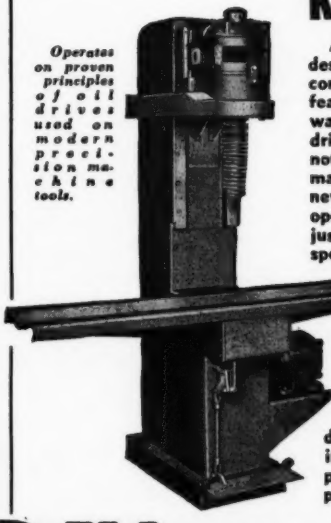
REDWOOD PIPE LASTS LONG AND SAVES MONEY

It has 14% greater carrying capacity than metal pipe. Resists Frost where severe winters raise havoc with metal pipe. Does not fill up with vegetable matter nor corrode; does not Scale or Pit; is immune to Electrolysis; weighs about 1/3 as much as metal pipe and more easily installed. Wyckoff Redwood Pipe, made of all Clear Heart Stock Redwood Lumber, made in sizes of one inch and up, maximum lengths 12 feet, for pressure to 172 pounds, is used extensively for Water Supply Lines, Penstocks, Sewage Lines, Chemicals, Paper Mills, Tanneries, Fisheries, Mines, and Fume Stacks. We can furnish selected Canadian White Pine or Oregon Fir Wood Pipe if specified. We also manufacture underground Wooden Steam Pipe Covering. Carload shipments can be made one day after receipt order.

A. WYCKOFF & SON COMPANY *Office and Factory,* **65 Home Street, ELMIRA, N. Y.**

The Originators of Machine Made Wood Pipe

NO Pipe Line CONNECTIONS In the New Murray KNOT DRILL



Operates on proven principles of oil drives used on modern precision machine tools.

A new idea in Knot Drill design and construction that combines all of the desirable features of a mechanical, water, air, or steam driven drill and with new features not found heretofore in any machine of this type. This new Knot Drill is flexible in operation and instantly adjusted to the top working speed of the operator. It is faster; self-contained; simple in construction; adjustable as to speed; and positive in action. This new drill is sturdily constructed, built for service, and will reduce cleaning costs while increasing efficiency and production. Write for complete details.

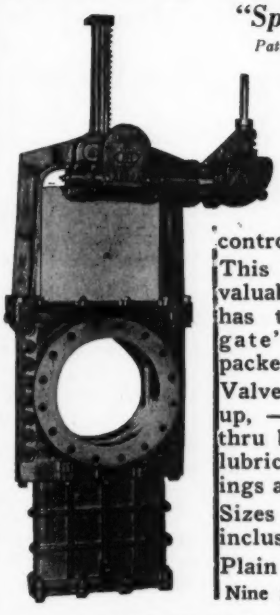
D. J. Murray Mfg. Co.

WAUSAU ~ WISCONSIN.

Record BONNETLESS VALVES

"Special Gate" Type

Patented in U. S. and Canada



Illustrated is an 18" renewable seat pulp stock valve of the above type, rack operated and equipped with worm and miter gearing for remote control.

This valve while embodying valuable "bonnetless" features has the "special hole thru gate" and necessary end packed chamber extension.

Valve is shown "open,—gate up, — full capacity straight thru bore and gate." Forced lubricated provided all packings and bearings.

Sizes six to twenty-four inch inclusive.

Plain or renewable seats.

Nine 24" Size in One Mill.

FURNISHED EITHER STANDARD GATE VALVE FACE TO FACE OR RECORD SHORT LENGTH

Manufactured by

RECORD FOUNDRY & MACHINE CO.

LIVERMORE FALLS, MAINE, U.S.A.

"GIANT" Multiplex No. 20— RAG CUTTER

This powerful cutter is used by leading mills to reduce rags and other material in the manufacture of roofing and felt papers.

Has an easy capacity of five tons an hour.

Other models to fit in with any production schedule.

TAYLOR-STILES & COMPANY

10 Bridge Street Riegelsville, N. J.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING JUNE 17, 1939

SUMMARY

Cigarette paper .....392 cs.
Wall paper .....3 bxs.
Paper hangings .....2 bls.
Newsprint .....10,490 rolls.
Printing paper .....8 bls., 24 cs.
Wrapping paper .....2266 pkgs., 206 rolls, 108 bls.
Kraft paper .....21 bls., 666 rolls
Drawing paper .....17 bls., 11 cs.
Filter paper .....6 cs.
Tracing cloth .....33 cs.
Surface coated paper .....247 cs.
Metal paper .....2 cs.
Photo paper .....2 cs.
Basic paper .....15 cs.
Parchment board .....1 cs.
Decalcomanias .....3 cs.
Decalcomania paper .....10 cs.
Stencil paper .....3 cs.
Paper tubes .....114 cs.
Miscellaneous paper .....302 rolls, 117 bls., 102 cs.

CIGARETTE PAPER

De Mauduit Paper Corp., *Normandie,* Havre, 2 cs.
Champagne Paper Corp., *Normandie,* Havre, 390 cs.

WALL PAPER

S. K. Lonegren, *Drottningholm,* Gothenburg, 3 bxs.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Banker,* London, 2 bls.

NEWSPRINT

Street & Smith Publications, *Cameronia,* Glasgow, 156 rolls.
Perkins Goodwin & Co., *Drottningholm,* Gothenburg, 314 rolls.
International Paper Co., *International # 1,* Gatineau, 376 rolls.
H. G. Craig Co., Inc., *G.D.D.,* Donnacona, 392 rolls.
Perkins Goodwin & Co., *Hansa,* Hamburg, 144 rolls.
H. G. Craig Co., Inc., *Newscarrier,* Donnacona, 378 rolls.
Jay Madden Corp., *Carolina Thorden,* Kotka, 867 rolls.
Parsons & Whittemore, Inc., *Hein Hoyer,* Sundsvall, 558 rolls.
N. Y. Evening Journal, *Carolina Thorden,* Kotka, 286 rolls.
Lunham & Reeve, Inc., *Carolina Thorden,* Kotka, 338 rolls.
Jay Madden Corp., *Mormacsun,* Rauma, 523 rolls.
H. G. Craig Co., Inc., *A.C.D.,* Donnacona, 372 rolls.
International Paper Co., *G.T.D.,* Gatineau, 373 rolls.
Jay Madden Corp., *Scanyork,* Kotka, 527 rolls.
Parsons & Whittemore, Inc., *Blankaholm,* Wifstavarf, 58 rolls.
——, *Blankaholm,* Hallstavik, 79 rolls.
Perkins Goodwin & Co., *Deutschland,* Hamburg, 404 rolls.
H. G. Craig Co., Inc., *Kermic,* Donnacona, 381 rolls.
International Paper Sales Co., *P. T. Dodge,* Dalhousie, 3964 rolls.

PRINTING PAPER

N. Y. World's Fair, *Jean Jadot,* Antwerp, 16 cs.
Rohner Gehrig & Co., *Bremen,* Bremen, 8 bls.
Oxford University Press, *American Importer,* Liverpool, 8 cs.

WRAPPING PAPER

Standard Products Corp., *Black Condor,* Antwerp, 6 rolls.
Jay Madden Corp., *Mormacsun,* Helsingfors, 45 bls.
——, *Mormacsun,* Rauma, 200 rolls, 63 bls., 2090 pkgs.
Jay Madden Corp., *Scanyork,* Helsingfors, 176 pkgs.

KRAFT PAPER

Arkell Safety Bag Corp., *Drottningholm,* Gothenburg, 12 rolls.
Metropolitan Paper & Bag Corp., *Drottningholm,* Gothenburg, 595 rolls, 21 bls.
King Filing Supplies Corp., *Drottningholm,* Gothenburg, 59 rolls.

DRAWING PAPER

H. Reeve Angel & Co., Inc., *American Banker,* London, 1 cs.
Keuffel & Esser Co., *Hansa,* Hamburg, 17 bls., 10 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., *American Banker,* London, 6 cs.

TRACING CLOTH

Keuffel & Esser Co., *American Importer,* Liverpool, 22 cs.
E. Dietzgen & Co., *American Importer,* Liverpool, 11 cs.

SURFACE COATED PAPER

Gevaert Co., of America, *Black Condor,* Antwerp, 247 cs.

METAL PAPER

H. W. Robinson Co., *Hansa,* Hamburg, 2 cs.

PHOTO PAPER

Medo Photo-Supply Co., *Aquitania,* Southampton, 2 cs.

BASIC PAPER

R. Wilson Paper Corp., *Black Condor,* Antwerp, 15 cs.

PARCHMENT BOARD

R. Wilson Paper Corp., *Black Condor,* Antwerp, 1 cs.

DECALCOMANIAS

Sellers Transportation Co., *Bremen,* Bremen, 3 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *American Importer,* Liverpool, 1 cs., 9 cs. (duplex).

STENCIL PAPER

American Express Co., *American Banker,* London, 3 cs.

PAPER TUBES

——, *Deutschland,* Hamburg, 114 cs.

MISCELLANEOUS PAPER

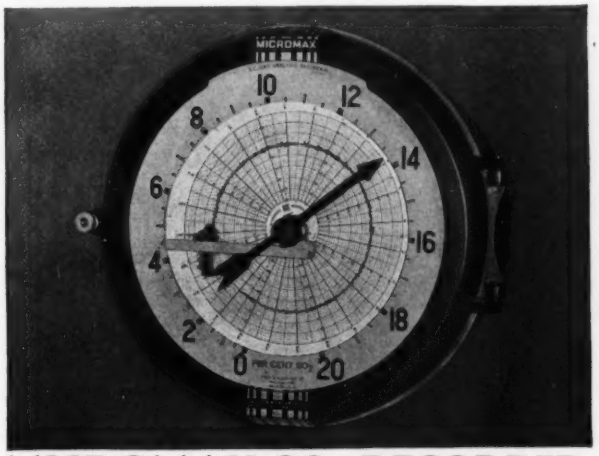
C. Happel, *Champlain,* Havre, 2 cs.
Jay Madden Corp., *Mormacsun,* Helsingfors, 2 rolls.
F. C. Strype, *Normandie,* Havre, 19 cs. 2 rolls.
H. Reeve Angel & Co., Inc., *Normandie,* Havre, 95 bls., 9 cs.
A. Giese & Son, *Normandie,* Havre, 22 bls.
H. W. Robinson Co., *Normandie,* Havre, 6 cs.
Keuffel & Esser Co., *Deutschland,* Hamburg, 11 cs., 12 rolls.
Remington Rand Inc., *Anna Maersk,* Kobe, 6 cs.
Japan Paper Co., *Anna Maersk,* Kobe, 47 cs.
The Borregaard Co., Inc., *Drottningholm,* Gothenburg, 286 rolls.
American Type Founders, *Drottningholm,* Gothenburg, 2 cs.

RAGS, BAGGINGS, ETC.

R. & V. Miller, Inc., *Drottningholm,* Gothenburg, 27 bls. rags.
Public National Bank Trust Co., *Samaria,* Liverpool, 15 bls. rags.
J. Cohen & Son, Co., Inc., *Samaria,* Liverpool, 16 bls. paper stock.
——, *Samaria,* Liverpool, 25 bls. rags.
——, *Exchange,* Tunis, 86 bls. rags.
Chase National Bank, *Black Condor,* Rotterdam, 190 bls. bagging.
Richard Shipping Co., *Black Condor,* Antwerp, 14 bls. rags.
R. Blank, *Exmoor,* Alexandria, 290 bls. colored cottons.
W. Steck & Co., *Exmoor,* Alexandria, 271 bls. bagging.
Irving Trust Co., *Exmoor,* Alexandria, 111 bls. bagging, 43 bls. old cottons.
E. J. Keller Co., Inc., *Exmoor,* ——, 256 bls. old cottons.
——, *American Importer,* Manchester, 41 bls. 59 bdls. waste paper.
Public National Bank, Trust Co., *American Importer,* Manchester, 17 bls. rags.
Darmstadt Scott & Courtney, *Scanyork,* Copenhagen, 11 bls. bag scrap.

MERRITT ENGINEERING AND SALES CO., INC.
LOCKPORT, N. Y.

"MESCO" CONSISTENCY REGULATORS
that regulate
Every job a custom built job
Consistency problems properly solved



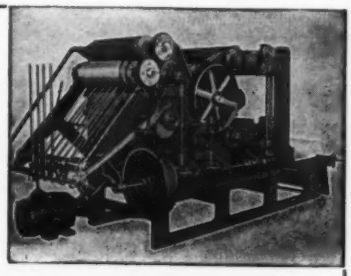
MICROMAX SO_2 RECORDER
Fast---Accurate---Low Maintenance

The elimination of analysis-cell corrosion and the use of a new low-maintenance mist filter make possible, for the first time, satisfactory recording of a continuous gas sample taken immediately after the burner. Due to this location and the elimination of an elaborate cleaning and drying system, the recorder's response to burner changes is almost immediate. Much closer burner control results.

Write For Further Information

LEEDS & NORTHRUP COMPANY
4905 STENTON AVENUE PHILADELPHIA, PA.
LEEDS & NORTHRUP
Measuring Instruments · Telemeters · Automatic Controls · Heat-Treating Furnaces

A LINE OF MACHINES YOU CAN DEPEND ON



PRINTING PRESSES
Rotary — Multi-color
Oil Ink — Arc-type
Analine — In series
Bag and Notion Envelope

EMBOSSERS
1. Glassine
2. Board
3. Towel
4. Tissue
5. Napkin
6. Wrapping
7. Special Purpose

MISCELLANEOUS
Toilet Roll Wrappers
Vacuum Pumps
Seat Cover Machines
Die Inkers
Core Machines
Core Recutters

FOLDERS
Towel — Wax
Tissue — Facial Tissue
Napkin — Table Covers

WINDERS
Toilet — Crepe
Towels — Jumbo Roll

CREPE MACHINE
Tissue — Kraft
Waterproof

BUNDLING PRESSES
Adjustable — Napkin
Multi-Wall Bag

PAPER CONVERTING MACHINE CO.
GREEN BAY, WISCONSIN
Manufacturers of paper converting machinery for all purposes.

FREDERICK Centrifugal PUMPS
CLOGLESS FOR HI-DENSITY STOCK
CENTRIFUGAL PUMPS FOR ALL PAPER MILL PURPOSES
ASH CONVEYORS——————STOKERS
THE FREDERICK IRON & STEEL CO.
FREDERICK, MARYLAND

D. M. Hicks, Inc., *Scanyork,* Copenhagen, 18 bls. rags.
———, *Bildersyk,* Rotterdam, 4 bls. rags.
Darmstadt Scott & Courtney, *Vigrid,* Aalborg, 193 bls. bagging.

HIDE CUTTINGS

———, *American Importer,* Liverpool, 368 bags.

WOOD PULP

Pagel Horton & Co., Inc., *Drottningholm,* Gothenburg, 750 bls. sulphate.
Chase National Bank, *Jean Jadot,* Antwerp, 42 bls. wood pulp.
Gottesman & Co., Inc., *Carolina Thorden,* Gothenburg, 600 bls. sulphate.
Pulp Sales Corp., *Mormacsun,* Kotka, 292 bls. sulphate, 49 tons.
Pulp Sales Corp., *Mormacsun,* Rauma, 3020 bls. sulphite, 582 tons.
Bulkley Dunton Pulp Co., Inc., *Hein Hoyer,* ———, 1375 bls. sulphate, 250 tons; 550 bls. sulphite, 110 tons.
J. Andersen & Co., *Hein Hoyer,* Sundsvall, 3600 bls. sulphate, 600 tons.
Cellulose Sales Co., Inc., *Hein Hoyer,* Sundsvall, 1675 bls. sulphite, 330 tons.
Mead Sales Co., Inc., *Hein Hoyer,* 500 bls. sulphite, 100 tons.
———, *Hein Hoyer,* Obbola, 3500 bls. sulphate, 500 tons.
———, *Hein Hoyer,* Hernosand, 6210 bls. sulphate; 2520 bls. sulphite.
Bank of N. Y. Trust Co., *Hein Hoyer,* Hernosand, 936 bls. dry mechanical pulp.
Pulp Sales Corp., *Scanyork,* Wiborg, 203 lbs. sulphate, 40 tons; 3048 bls. sulphite 584 tons; 508 bls. mechanically ground pulp, 99 tons.
Castle & Overton, Inc., *Scanyork,* Wiborg, 262 bls. wood pulp, 52 tons.
Pulp Sales Corp., *Scanyork,* Kotka, 175 bls. sulphite, 29 tons.
Stora Kopparberg Corp., *Blankaholm,* Skutskar, 930 bls. dry pulp.
Beaverite Products, Inc., *Deutschland,* Hamburg, 23 bls. wood pulp.

WOOD PULP BOARDS

H. Fuchs & Son, *Drottningholm,* Gothenburg, 19 crates.
Salwen Paper Co., *Drottningholm,* Gothenburg, 8 bls.
W. Bersch, *Hansa,* Hamburg, 100 bls.
Jay Madden Corp., *Carolina Thorden,* Kotka, 281 rolls, 321 bls.
Jay Madden Corp., *Carolina Thorden,* Viipuri, 75 ctns., 32 bls.
Jay Madden Corp., *Scanyork,* Kotka, 261 rolls.
Jay Madden Corp., *Scanyork,* Wiborg, 155 bls.
W. Bersch, *Deutschland,* Hamburg, 70 bls.

ALBANY IMPORTS

WEEK ENDING JUNE 17, 1939

Perkins Goodwin & Co., *Hein Hoyer,* Soderhamn, 1875 bls. sulphate, 375 tons.
Cellulose Sales Co., Inc., *Hein Hoyer,* Soderhamn, 250 bls. sulphite, 50 tons.
Bulkley Dunton Pulp Co., Inc., *Hein Hoyer,* ———, 250 bls. sulphite, 50 tons.
Perkins Goodwin & Co., *Hein Hoyer,* Sundsvall, 6,000 bls. sulphate, 1000 tons.
Cellulose Sales Co., Inc., *Hein Hoyer,* 180 bls. sulphate, 30 tons; 5228 bls. sulphite, 983 tons.
Brown Bros., Harriman & Co., *Hein Hoyer,* Hernosand, 1080 bls. sulphate.
Bank of N. Y. Trust Co., *Hein Hoyer,* 3480 bls. sulphite, 300 bls. dry mechanical pulp.

BOSTON IMPORTS

WEEK ENDING JUNE 17, 1939

———, *Black Hawk,* Antwerp, 72 bls. rags.
Pulp Sales Corp., *Mormacsun,* Kotka, 1396 bls. sulphite, 240 tons.
Castle & Overton, Inc., *Mormacsun,* Kotka, 1150 bls. wood pulp, 238 tons.
Stone & Downer, Co., *Mormacsun,* Kotka, 82 rolls newsprint.
New England Newspaper Publishing Co., *Mormacsun,* Kotka, 418 rolls newsprint.
International Paper Sales Co., *P. T. Dodge,* Dalhousie, 2798 rolls newsprint.
Gottesman & Co., Inc., *Carolina Thorden,* Sweden, 500 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING JUNE 17, 1939

F. Whitaker Co., *Black Hawk,* Rotterdam, 22 bls. bag scrap.
E. J. Keller Co., Inc., *Black Condor,* ———, 181 bls. rags.
———, *Black Condor,* Antwerp, 15 bls. wrapping paper.
E. J. Keller Co., Inc., *Exmoor,* ———, 87 bls. old cottons, 329 bls. rags.
Castle & Overton, Inc., *Exmoor,* Alexandria, 75 bls. old cottons.
F. Weber Co., *Exmoor,* Genoa, 9 cs. paper.
———, *Scanyork,* Stockholm, 180 bls. sulphite, 30 tons.
Jay Madden Corp., *Scanyork,* Helsingfors, 241 rolls wrapping paper.
Pulp Sales Corp., *Scanyork,* Wiborg, 267 bls. wood pulp, 53 tons.
Jay Madden Corp., *Scanyork,* Wiborg, 5 bls. wood pulp boards.
Pulp Sales Corp., *Scanyork,* Kotka, 210 bls. sulphite, 42 tons.
Jay Madden Corp., *Scanyork,* Kotka, 180 rolls newsprint.
F. Whitaker Co., *Scanyork,* Copenhagen, 6 bls. rags.

WILMINGTON IMPORTS

WEEK ENDING JUNE 17, 1939

Pulp Sales Corp., *Mormacsun,* Rauma, 6280 bls. sulphite, 1080 tons.

BALTIMORE IMPORTS

WEEK ENDING JUNE 17, 1939

Congoleum Nairn Co., *Ingria,* Marseilles, 1486 bls. rags.
Pompeian Olive Oil Corp., *Ingria,* Marseilles, 25 cs. filter paper.
Jay Madden Corp., *Carolina Thorden,* Kotka, 640 rolls newsprint.
Hearst Consolidated Publications, *Carolina Thorden,* Kotka, 589 rolls newsprint.
Gottesman & Co., Inc., *Carolina Thorden,* Gothenburg, 625 bls. wood pulp.
Pulp Sales Corp., *Carolina Thorden,* Viipuri, 455 bls. sulphite, 1016 bls. sulphate.
Pulp Sales Corp., *Carolina Thorden,* Helsingfors, 520 bls. mechanically ground pulp.
Bulkley Dunton Pulp Co., Inc., *Scanyork,* ———, 840 bls. sulphite, 142 tons.
———, *Scanyork,* Stockholm, 210 bls. sulphite, 35 tons.
Darmstadt Scott & Courtney, *Scanyork,* Stockholm, 196 bls. rags.
Pulp Sales Corp., *Scanyork,* Helsingfors, 572 bls. sulphite, 115 tons.
Castle & Overton, Inc., *Scanyork,* Wiborg, 1760 bls. wood pulp, 351 tons.
Pulp Sales Corp., *Scanyork,* 320 bls. sulphate, 53 tons; 2675 bls. wood pulp, 535 tons.
Jay Madden Corp., *Scanyork,* Kotka, 58 rolls newsprint.
Pulp Sales Corp., *Scanyork,* Kotka, 175 bls. sulphate, 35 tons; 1916 bls. sulphite, 318 tons.
———, *Bilderdyk,* Rotterdam, 31 bls. rags.
M. Sone, *Viva,* Hernosand, 3000 bls. wood pulp.
M. Sone, *Viva,* Soderhamn, 2500 bls. wood pulp.
M. Sone, *Clara,* Trieste, 324 bls. wood pulp.

NORFOLK IMPORTS

WEEK ENDING JUNE 17, 1939

Meed Sales Co., Inc., *Hein Hoyer,* Sundsvall, 3225 bls. sulphite, 625 tons.
Perkins Goodwin & Co., *Hein Hoyer,* Obbola, 500 bls. mechanical pulp, 100 tons.
Bank of N. Y. Trust Co., *Hein Hoyer,* Hernosand, 150 bls. mechanical pulp.

NEWPORT NEWS IMPORTS

WEEK ENDING JUNE 17, 1939

Cellulose Sales Co., Inc., *Hein Hoyer,* Soderhamn, 1150 bls. sulphate, 230 tons.
Bulkley Dunton Pulp Co., Inc., *Hein Hoyer,* ———, 3080 bls. sulphate, 560 tons.
Cellulose Sales Co., Inc., *Hein Hoyer,* Sundsvall, 1980 bls. sulphate, 330 tons.

SOUTH HAVEN IMPORTS

WEEK ENDING JUNE 17, 1939

M. Sone, *Trajan,* Hamburg, 3330 bls. wood pulp.

COLORS

for

Board and *Paper*

Green

CHROMIUM OXIDES

Black Brown Red Yellow

IRON OXIDES

LAMP BLACK

TALC

UMBERS

VENETIAN REDS

YELLOW OCHRES

C. K. WILLIAMS & CO.

Easton, Pa.

B&L PAPER FIBER MICROSCOPE DESIGNED FOR THE PAPER TECHNOLOGIST

Among its many uses are — fiber analysis of paper furnishes; speck analysis; determination of fiber lengths; beating characteristics of pulps; particle size of filler; surface characteristics, and photomicrographic recording.

Equipped with large reagent and alcohol proof stage, detachable graduated mechanical stage, stage micrometer, rack and pinion substage with Abbe condenser. Graduated adjustable draw tube with locking clamp. 10X eyepiece has special micrometer disc.

Write for full particulars to Bausch & Lomb Optical Co., 627 St. Paul St., Rochester, N. Y.

BAUSCH & LOMB

FOR YOUR EYES, INSIST ON BAUSCH & LOMB EYEWEAR, MADE FROM BAUSCH & LOMB GLASS TO BAUSCH & LOMB HIGH STANDARDS OF PRECISION

DYESTUFFS

for BEATER, CALENDER or COATED PAPERS

NEW YORK · PHILADELPHIA · PROVIDENCE · BOSTON · CHICAGO · CHARLOTTE · MONTREAL · SAN FRANCISCO

CIBA COMPANY INCORPORATED

GREENWICH & MORTON STS.

NEW YORK

REPRESENTING

SOCIETY OF CHEMICAL INDUSTRY IN BASLE

VAT DYES OF

THE DOW CHEMICAL COMPANY

WOOD PULP AGENTS

PRICE & PIERCE, Ltd.,

60 EAST 42nd ST.

NEW YORK

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, June 21, 1939.

Sales volume in the wholesale paper market is reported to be well maintained at a good level during the current week, according to reports received from many manufacturers' representatives, jobbers, and general paper merchants. General industrial activity has shown a sharp increase and in many parts of the country trade is at a higher level than had been forecasted. In general, business reports indicate that the volume of trade is about equal to the national average in the New York area and in parts of the Middlewest, below the national average on the Pacific Coast, and better than the national average in some of the Southeastern cities.

The trend of general business activity has been upward since the decline over the Memorial Day holiday. The index of general business activity advanced to 89.8 per cent for the week ended June 10, from 86.0 per cent for the previous week, and compared with 76.6 per cent for the corresponding week last year. All components forming the index advanced.

Production of some 212 paper mills for the week ended June 10 rose to 76.0 per cent, from 73.9 per cent in the preceding week, compared with 64.9 per cent for the corresponding period last year, and with 88.2 per cent in 1937. Paper board production for the week ended June 10 increased to 66.0 per cent, from 57.0 per cent in the previous week, compared with 80.2 per cent for the corresponding period in 1937.

No important change in the newsprint situation has been reported at this date. Consumption continues below trade expectations but in view of the current improvement in general business activity, the outlook in this market is regarded as better than for some months.

Sales volume in many grades of white paper continues at a good level this week. More optimism is reflected in the book paper division of the trade, since the recent increase in magazine advertising, which is viewed by many business men as an indication of increased business activity. Prices on all grades of white paper are relatively firm and unchanged.

Kraft paper production and shipments are reported maintained at a relatively high level. Prices, while generally regarded in the trade as too low in comparison with production costs, continue reasonably firm and the practice of giving price concessions is much less prevalent than last year.

The paper board market continues firm and active. Prices remain unchanged.

Mechanical Pulp

No important change in demand or prices has been reported in mechanical pulp for the current week. Consumption continues steady at a good level.

Chemical Pulp

Consumption of chemical pulp continues at a good level as the production ratio of many mills is reported running at or above 75 per cent of capacity. Prices on all grades of domestic and imported pulps are relatively firm and unchanged at prevailing market quotations.

Old Rope and Bagging

No important change in demand or prices has been reported in old rope this week and this market is quiet. The demand for old domestic bagging continues very light and this market is quiet. Prices are unchanged.

Rags

Trading in all grades of paper making rags is reported as slow. Prices continue fairly firm with no important changes reported this week. Demand for roofing rags has fallen off and the No. 1 grade is currently quoted at from .85 to .95.

Old Waste Paper

The old waste paper market continues firm. Board mill demand is reported as steady and no stock is being accumulated. Prices are unchanged.

Twine

No important change in demand has been reported this week in twine. Quotations are relatively firm on all grades of hard and soft fiber twines and continue unchanged at this date.

Newsprint Production Increases

Production of newsprint in Canada during May 1939 amounted to 250,015 tons and shipments to 274,635 tons, according to the News Print Service Bureau. Production in the United States was 85,872 tons and shipments 84,443 tons, making a total United States and Canadian newsprint production of 335,887 tons and shipments of 359,078 tons. During May, 22,298 tons of newsprint were made in Newfoundland, so that the total North American production for the month amounted to 358,185 tons. Total production in May 1938 was 295,668 tons.

The Canadian mills produced 42,342 tons more in the first five months of 1939 than in the first five months of 1938, which was an increase of four per cent. The output in the United States was 62,754 tons or nineteen and one tenth per cent more than in the first five months of 1938, in Newfoundland 3,514 tons or three and one tenth per cent more, making a total increase of 108,610 tons, or seven and two tenths per cent.

Stocks of newsprint paper at the end of May were 187,880 tons at Canadian mills and 21,494 tons at United States mills, making a combined total of 209,374 tons compared with 232,565 tons on April 30, 1939.

J. Andersen & Co.

Selling Agents

21 East 40th Street

New York

CHEMICAL & MECHANICAL PULP

Kraft Pulp

SUNDSVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
KAMK TRÄINDUSTRI AKTIEBOLAG
Vansfjärden, Sweden
MUNKSUNDS AKTIEBOLAG
Munksund, Sweden
MUNKSJÖ CELLULOSA A.-B.
Springerviken, Sweden

Bleached Sulphite

KRAMER-FABRINGTON PAPER PULP CO., LTD.
Sarpsborg, Norway
Edsvalla, Sweden
Hallein & Villach, Austria

Unbleached Sulphite

AKTIESELSKABET ORKLA CELLULOSEFABRIK
Greaker, Norway
SUNDSVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
CELLULOSEFABRIKEN A.-G.
Bruckner, Czecho-Slovakia
SVANÖ AKTIEBOLAG
Svanö, Sweden

POTDEVIN

Multi-Color, Multi-Size

PIGMENTED-ANILINE WEB PRESSES

POTDEVIN

with the

GOOD INVESTMENT FEATURE

In order to be considered a good investment, a press must pay for itself within two years and then give many years of "as good as new" service.

POTDEVIN aniline web presses are constructed with this in mind. They are rugged minimizing "breakdown" and repairs. The materials used (the rubber, bronze, steel, etc.) are scientifically selected for their particular purpose. This assures years of dependable, accurate operation.

Remember POTDEVIN and this "good investment" feature when buying.

POTDEVIN MACHINE CO.

1223 38th St. Brooklyn, N. Y.
Est. 1893 Tel. Windsor 6-1700-1-2-44

THE DRAPER FELTS

All kinds and styles of Felts for all kinds and styles of Papers.

Write us about your Felt problems and let us help you reduce your Felt Costs—we will call anywhere at any time.

DRAPER BROS. COMPANY

CANTON, MASS.

Woolen manufacturers since 1856

HIGHEST QUALITY CLAYS

LUMP and POWDERED } IMPORTED

DOMESTIC { CRUDE CRUSHED, AIR FLOATED, WATER WASHED

PAPER MAKERS IMPORTING CO. INC. NEW YORK, PHILADELPHIA, PENNSYLVANIA

PRECIPITATED CALCIUM CARBONATE

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, June 21, 1939.

BLANC FIXE—Quotations on blanc fixe remain firm and conform to prevailing market levels. The pulp is quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—Prices on bleaching powder continue firm and unchanged at prevailing market quotations. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The demand for casein is reported to continue good for the current week. Prices are unchanged. Standard domestic casein, 20-30 mesh, is currently quoted at from 8½ to 9 cents per pound; 80-100 mesh, at from 8 to 9½ cents per pound. All prices in bags, car lot quantities.

CAUSTIC SODA—Quotations on caustic soda remain unchanged at prevailing market levels. Solid caustic soda is currently quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Prices on china clay continue firm and conform to prevailing market quotations. Imported clay is quoted at from $13 to $25 per ton, ship side. Domestic filler clay is currently offered at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines.

CHLORINE—Quotations on chlorine continue firm and unchanged at prevailing market levels. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported as firm for the current week. Prices remain unchanged. "G" gum rosin is quoted at $4.85; "FF" wood rosin at $4.45, per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent gum rosin size is offered at $2.70 per 100 pounds, f.o.b., shipping point.

SALT CAKE—Quotations on soda ash continue firm and unchanged at prevailing market levels. Quotations range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12 per ton, f.o.b., shipping point. Imported salt cake is offered at from $14.50 to $15 per ton, Gulf or Atlantic Seaboard, on dock.

SODA ASH—Prices on soda ash continue firm and conform to prevailing market quotations. Current prices on soda ash in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.25.

STARCH—The demand for corn starch is reported as good. Quotations are firm and unchanged at prevailing market levels. Globe pearl is currently quoted at $2.55 per 100 pounds; special paper starch is offered at $2.65 per 100 pounds. All prices in bags, car lot quantities, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are reported firm and unchanged at prevailing market levels. The commercial grades are currently quoted at $1.15; iron free at $1.30 per 100 pounds, in bags, car lot quantities, f.o.b., works.

SULPHUR—Prices on sulphur are reported as firm and unchanged at prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are offered at $19 per ton.

TALC—Quotations on talc remain firm and conform to prevailing market prices. Domestic talc is currently quoted at from $15 to $18 per long ton, f.o.b., Eastern mines. Imported talc is offered at from $25 to $40 per ton, on dock.

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$4.75	@	$5.25
Superstandard	4.12½	@	4.62½
Northern Standard Wrapping	4.00	@	—
Standard Wrapping	3.50	@	—
Tissues—Per Ream—Carlots			
White No. 1	$0.82½	@	—
White No. 1 M. G.	.80	@	—
White No. 1½	.67½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.65	@	—
Colored	.77½	@	—
Kraft	.65	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	2.65	@	—
Bleached Toilet	5.26	@	—
Paper Towels—Per Case			
Unbleached, Jr.	$1.75	@	—
Bleached Jr.	3.10	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	7.75	@	9.75
No. 1 Manila Wrapping, 35 lb.	5.00	@	—
No. 2 Manila Wrapping, 35 lb.	4.75	@	—
Boards, per ton—			
News	30.00	@	32.50
Chip	30.00	@	32.50
Sgl. Mla. Ll. Chip.	42.50	@	—
Jute Lined Chip	42.50	@	45.00
White Pat. Coated	55.00	@	57.50
Kraft Liners	45.00	@	—
Binders Boards	71.00	@	77.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1.	$39.10	@ $46.00	$40.25	@ $47.25
100% Rag	31.05	@ 36.50	32.30	@ 37.75
85% Rag	.....		29.90	@ 35.00
75% Rag	23.60	@ 27.75	24.75	@ 29.00
65% Rag	.....		21.65	@ 26.25
50% Rag	17.55	@ 21.50	18.70	@ 22.75
25% Rag	14.65	@ 17.75	15.80	@ 19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$8.60	@ $10.50	$9.75	@ $12.00
No. 2	7.70	@ 9.50	8.90	@ 10.75
No. 3	6.75	@ 8.25	7.90	@ 10.00
No. 4	7.00	@ 8.50	8.20	@ 10.00

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

No. 1 Glossy Coated	$11.30	@	$12.75
No. 2 Glossy Coated	9.70	@	11.00
No. 3 Glossy Coated	8.60	@	10.00
No. 4 Glossy Coated	8.05	@	9.25
No. 1 Antique (watermarked)	8.05	@	9.25
No. 2 Offset	7.45	@	8.50
A Grade E. F.	7.20	@	8.25
A Grade S. & S. C.	7.45	@	8.50
B Grade E. F.	6.65	@	7.75
B Grade S. & S. C.	6.90	@	8.00
C Grade E. F.	6.40	@	7.50
C Grade S. & S. C.	6.65	@	7.75
D Grade E. F.	6.10	@	7.00
D Grade S. & S. C.	6.35	@	7.25

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	25.00	@	28.00
Dry	25.00	@	28.00
(Delivered)			
No. 1 Domestic and Canadian	29.00	@	33.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	2.25	@	2.75
Prime Qualities—			
Easy-Bleaching Sulphite	1.90	@	2.00
Strong Unbleached Sulphite	1.80	@	1.95
(On Dock, Atlantic Ports)			
Kraft Bleached	2.50	@	2.75
Kraft Light & Strong	1.60	@	1.75
Kraft No. 1	1.45	@	1.60
Kraft No. 2	1.35	@	1.40
(F. o. b. Pulp Mill)			
Kraft Domestic	1.85	@	1.95
(Delivered)			
Soda Bleached	2.55	@	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.75	@	7.00
Silesias No. 1	4.50	@	4.75
New Unbleached	6.75	@	7.00
Blue Overall	4.90	@	5.00
Fancy	1.75	@	2.00
Washables	1.50	@	1.60
Mixed Khaki Cuttings	2.25	@	2.50
O. D. Khaki Cuttings	3.25	@	3.40

Old Rags

White, No. 1—			
Repacked	2.90	@	3.15
Miscellaneous	2.10	@	2.35
White, No. 2—			
Repacked	1.50	@	1.60
Miscellaneous	1.25	@	1.40
Thirds and Blues—			
Repacked	1.30	@	1.40
Miscellaneous	1.15	@	1.20
Roofing Rags—			
No. 1	.85	@	.95
No. 2	.67½	@	.77½
No. 3 (bagging)	.55	@	.65
No. 4	.60	@	.65
No. 5A	.60	@	.65

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	@	2.20
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxford	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.50
No. 2 White Linens	6.50	@	7.50
No. 3 White Linens	4.50	@	—

WATERBURY FELTS

Are Made By

H. WATERBURY & SONS CO.

ORISKANY, NEW YORK

JOHNSON & WIERK, INC.

PULP AND PAPER MILL ENGINEERS

Reports, Designs, and Construction Supervision

ESTIMATES
MACHINE DESIGN
IMPROVEMENTS
NEW MILL OR
POWER PROJECTS

MILL BUILDINGS
EQUIPMENT LAYOUTS
STEAM, HYDRAULIC
AND ELECTRIC
POWER HOUSES

Grand Central Terminal Bldg., NEW YORK, N. Y.
Branch: 246 Stuart Street BOSTON, MASS.

CASEIN

Uniform Quality

Dependable Service

Special Types to Meet Unusual Requirements

CASEIN COMPANY OF AMERICA
DIVISION OF THE BORDEN COMPANY
350 Madison Avenue, New York, N. Y.
40 Years of Service to Users of Casein Products

GEORGE F. HARDY
Consulting Engineer
305-309 Broadway, New York City, N. Y.
Member—Am. Soc. C.E.—Am. Soc. M.E.—Eng. Inst. Can.

Consultation
Reports
Valuations
Estimates

Paper and Pulp Mills
Hydro-Electric and
Steam Power Plants
Plans and Specifications

HARDY S. FERGUSON & CO.
Consulting Engineers
200 FIFTH AVENUE, NEW YORK CITY

Hardy S. Ferguson.....Member A.S.C.E., A.S.M.E., E. I. C.
Messe H. Teaze.....Member A.S.M.E., E. I. C., A.S.C.E.

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of

Pulp and Paper Mills and other Industrial Plants
Steam and Hydro-Electric Power Plants
Dams and Other Hydraulic Structures

SONOCO
PAPER MILL CORES

RETURNABLE
DURO —our standard returnable paper mill core of plus-standard quality.
EN-DURO —a super-quality core to meet demands for extra strength and service.

NON-RETURNABLE
RHINO
—an extremely tough and strong core with a low cost that meets the market for a standard product giving superior service.

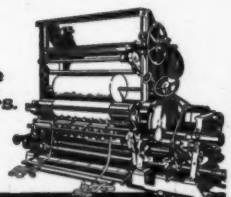
SONOCO PRODUCTS COMPANY
BRANTFORD, ONT. HARTSVILLE, S. C. MYSTIC, CONN.
GARWOOD, N. J. ROCKINGHAM, N. C. LOWELL, MASS.

PAPER MILL CONSTRUCTION
Complete Service Undivided Responsibility
Buildings Docks
Machinery Installation Foundations

INTERNATIONAL PULP CO.
NEW YORK CITY
ASBESTINE FILLER
Reg. U. S. Patent Office 90% Retention

LANGSTON SLITTERS AND ROLL WINDERS

There is a type and size for every job—from tissue to heavy board—narrow to wide cuts—small to large diameters.
SAMUEL M. LANGSTON COMPANY, *Camden, N. J.*



—a Shear Cut—a Clean Cut.

NOPCO
"EVOLVED THRU RESEARCH"
FOR BETTER PAPER PRODUCTION

Foam Killers • Defoamers and Eveners • Sulphonated Oils
Pitch Emulsifiers • Penetrants • Wax Sizes • Glycerine
Soaps • Felt Washing Compounds • Glycerine Substitutes

NATIONAL OIL PRODUCTS CO.
HARRISON, N. J.
BOSTON CHICAGO CEDARTOWN, GA. SAN FRANCISCO

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	@	4.75
No. 2 White Cotton.	3.25	@	3.75
No. 3 White Cotton.	2.50	@	3.00
No. 4 White Cotton.	1.90	@	2.20
Extra Light Prints..	2.00	@	2.40
Ord. Light Prints...	1.75	@	2.15
Med. Light Prints...	1.55	@	1.95
Dutch Blue Cottons.	2.25	@	2.50
French Blue Linens..	3.00	@	—
Checks and Blues...	2.00	@	—
Linsey Garments....	1.90	@	2.00
Dark Cottons.....	1.50	@	1.60
Old Shopperies.....	1.30	@	1.45
New Shopperies.....	1.45	@	1.50
French Blues.....	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	1.75	@	1.90
Domestic	1.75	@	1.80
Wool Tares, light...	1.60	@	1.70
Wool Tares, heavy..	1.80	@	1.90
Bright Bagging.....	1.60	@	1.70
Manila Rope—			
Foreign	2.60	@	2.75
Domestic	2.75	@	3.00
Jute Threads.....	3.00	@	3.25
Sisal Strings	1.50	@	1.60
Mixed Strings....	.55	@	.60

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.30	@	2.40
Ordinary Hard White No. 1	1.90	@	2.00
Soft White No. 1..	1.60	@	1.75
Soft White Extra..	2.25	@	2.40
Flat Stock—			
Stitchless	.80	@	.85
Overissue Mag	.70	@	.75
Solid Flat Book...	.55	@	.60
Crumbled No. 1...	.40	@	.45
Ledger Stock White.	1.05	@	1.15
Ledger Stock Colored	.60	@	.70
New B. B. Chips....	.15	@	.20
Manila—			
New Env. Cut....	1.40	@	1.50
New Cuttings.....	1.00	@	1.20
Old Kraft Machine—			
Compressed bales..	.60	@	.65
News—			
No. 1 White News	1.25	@	1.30
Strictly Overissue.	.40	@	.45
Strictly Folded....	.27½	@	.32½
No. 1 Mixed Paper..	.17½	@	.22½

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.12¾	@	.14¾
White Hemp.....	.13¾	@	.15¾
Fine Polished—			
Fine India.....	.16	@	.18
Unpolished—			
Box	.09½	@	—
Paper Makers.....	.09½	@	.10½
Tube Rope.....	.10¾	@	.12½
Wall Paper.....	.10¾	@	.12½
Wrapping	.12	@	—
Soft Fiber Rope...	.12	@	.14
Cotton	.16	@	.19

(Hard Fiber)

Medium Java.....	.11	lb	.17
Mex. Sisal.....	.10	@	.16
Manila	.16	@	.23

Domestic	2.65	@	2.75
Sisal Rope	1.75	@	1.85
Mixed Rope.....	.45	@	.50
Transmission Rope...	1.90	@	2.00
Soft Jute Rope	2.00	@	2.25
Jute Carpet Threads.	.75	@	.90
Gunny Bagging—			
Foreign	1.50	@	1.65
Domestic	1.40	@	1.50
Bleachery Burlap....	2.50	@	2.70
Gunny Bagging.....	1.45	@	1.60
Scrap Burlap—			
Foreign	1.35	@	1.40
Domestic	1.25	@	1.40
Scrap Sisal.....	1.55	@	1.60
Scrap Sisal for Shredding	1.75	@	1.80
Wool Tares, Heavy..	1.40	@	1.50
New Burlap Cuttings	2.25	@	2.40
Aust. Wool Pouches.	1.75	@	2.00
Heavy Baling Bagging	1.50	@	1.60
Paper Mill Bagging..	.85	@	1.00
No. 2 Bagging.....	.45	@	.50

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints...	.03¼	@	.03½
New White No. 1....	.0675	@	.0690
New Light Flannelettes	.05	@	—
Silesias No. 1.....	.04	@	.04¼
New Black Silesias..	.03½	@	.03¾
Soft Unbleached.....	6.50	@	7.00
Blue Cheviots.....	.05	@	.05¼
Fancy	.02	@	.02½
Washable	.02	@	.02½
Cottons—According to grades—			
Blue Overalls.....	.04¼	@	.05
New Black, soft...	.03¾	@	.04
Khaki Cuttings.....	.02½	@	.03
O. D. Khaki.....	.03	@	.03¼
Corduroy	.02¾	@	.03
New Canvas.....	.06¾	@	.07¼
B. V. D. Cuttings...	.06¾	@	.07

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04¼	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Old Blue Overalls...	1.50	@	—
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1	1.00	@	1.10
No. 2	.75	@	.85
No. 3	.65	@	.70

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	.90	@	1.05
Dutch Blues.....	2.65	@	2.75
New Checks and Blues	2.85	@	3.00
Old Fustians.....	2.25	@	2.50
Old Linsey Garments.	2.10	@	2.25
New Silesias.....	3.75	@	4.00

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phil.)

Shirt Cuttings—			
New White, No. 1.	.06	@	.06½
New White, No. 2.	.03½	@	.04
Light Silesias.....	.03½	@	.04
Silesias, No. 1....	—	@	.04½
Black Silesias, soft	—	@	.03
New Unbleached..	.05½	@	.06
Washable, No. 1..	.01½	@	.01¾
Blue Overall.....	.04	@	.04½
Cottons—According to grades—			
Washable No. 2...	.01	@	.01¼
New Blue.....	.01	@	.01¼
Fancy Percales...	—	@	.02½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.04½
New Dark Seconds	.50	@	.75
Khaki Cuttings—			
No. 1 O. D.....	.03	@	.03½
No. 2 Mixed.....	.02	@	.02½
Corduroy	—	@	.02
New Canvas.....	.05	@	.05½
New Black Mixed.	.02½	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	2.75	@	3.00
Miscellaneous	2.00	@	2.25
Thirds and Blues—			
Miscellaneous	1.00	@	1.25
Repacked	1.50	@	1.75
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1.....	.90	@	1.10
Domestic No. 1...	.80	@	.90
Domestic No. 2...	.60	@	.65
Roofing Bagging...	.40	@	.45

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	—	@	1.50
Domestic	1.50	@	1.60
Manila Rope.....	—	@	3.00
Sisal Rope.....	1.50	@	1.75
Mixed Rope.....	.75	@	1.00
Scrap—			
No. 1	—	@	1.50
No. 2	.80	@	.90
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	.45	@	.50
No. 1 New Light Burlap	2.50	@	3.00
New Burlap Cuttings	1.75	@	2.00

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 2 Hard White	2.25	@	2.30
No. 2 Hard White	1.90	@	2.00
No. 1 Soft White.	1.75	@	1.80
No. 2 Soft White.	1.30	@	1.40
No. 1 Mixed.....	.65	@	.75
Solid Ledger Stock..	1.45	@	1.50
Ledger Stock, white.	1.15	@	1.20
Ledger Stock, colored	.75	@	.80
No. 1 Books, heavy.	.60	@	.75
Manila Cuttings....	1.45	@	1.50
Print Manila.....	.45	@	.50
Container Manila...	.35	@	.40
Kraft Paper.....	.75	@	.80
No. 1 Mixed Paper..	.22½	@	.27½
Straw Board Chip...	.25	@	.30
Binders Board Chip.	.25	@	.30
Corrugated Board...	.50	@	.55
Overissue News.....	.40	@	.45
Old Newspapers....	.35	@	.40

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.25	@	2.50
No. 1 Soft White.	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.30	@	—
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	.65	@	.75
No. 1 Books, light..	.65	@	.75
Crumpled Stitchless Book Stock.....	.55	@	.65
Manila Env. Cuttings	1.70	@	1.85
Manila Envelope Cuttings, Extra Quality	2.00	@	2.10
No. 1 Old Manila...	.65	@	.70
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	.65	@	.75
Mixed Papers.....	.15	@	.17½
Print Manila.....	.45	@	.55
Container Manilas..	.27½	@	—
Old Newspapers.....	.27½	@	.32½
Paper Wool Strings..	.60	@	.65
Overissue News.....	.45	@	.50
Box Board Chips....	.20	@	.25
Corrugated Boxes....	.30	@	.32½
Kraft corrugated boxes	.60	@	.65
Screening Wrappers.	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.50	@	2.65

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	1.80	@	1.90
No. 1 Hard White.	1.70	@	1.80
No. 1 Soft White..	1.50	@	—
Ledger & Writings..	.75	@	.80
Solid Books.....	.45	@	.50
Blanks	.90	@	—
Krafts	.45	@	.50
New Kraft Cuts.....	1.10	@	—
Manila Env. Cuts...	Nominal		
Ex. No. 1 Manila...	Nominal		
Print Manila	Nominal		
Overissue News.....	.35	@	—
Old Newspapers—			
No. 1 Folded News	.25	@	.30
No. 1 Mixed Paper	.15	@	.20
Roofing Stocks—			
No. 1	1.00	@	1.05
No. 2	.85	@	—

TORONTO

Paper

Bonds

Direct mill shipment in two-ton lots

No. 1 White	$35.50	@	—
No. 1 Tints	36.50	@	—
No. 2 White	25.50	@	—
No. 2 Tints	26.50	@	—
No. 2 Golden Rod..	27.50	@	—
No. 3 White	21.00	@	—
No. 4 White	15.00	@	—
No. 4 Tints	16.00	@	—
No. 4 Golden Rod...	17.00	@	—

Direct mill shipment in three-ton lots

No. 5 White	$10.50	@	—
No. 5 Tints	11.50	@	—
No. 5 Golden Rod..	12.00	@	—
No. 6 White	9.00	@	—
No. 6 Tints	9.50	@	—
No. 6 Golden Rod..	11.00	@	—
No. 7 White	8.00	@	—
No. 7 Tints	8.50	@	—
No. 7 Golden Rod..	10.00	@	—
Book—			
No. 1 M. F.	$7.00	@	—
No. 2 M. F.	6.50	@	—
No. 3 M. F.	5.35	@	—
No. 1 S. C.	7.25	@	—
No. 2 S. C.	6.75	@	—
No. 3 S. C.	5.85	@	—

Coated Book & Litho

Ton Lots (resale)

No. 1	$12.00	@	—
No. 2	10.25	@	—
No. 3	8.90	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown.....	4.85	@	5.25
White Wrap.....	4.00	@	—
"B" Manila.....	4.90	@	6.15
No. 1 Manila.....	5.50	@	6.90
Fiber	5.50	@	6.90
Kraft No. 2.....	5.50	@	6.90

(F. o. b. Cars, Toronto)

News per ton—			
Rolls (contract)..)	46.00	@	—
Sheets	54.00	@	—

Pulp

Ground wood.....	$29.00	@	—
Unbleached sulphite.	44.00	@	—
Bleached sulphite...	54.00	@	—
Kraft	50.00	@	—
Soda	54.00	@	—

Old Waste Paper

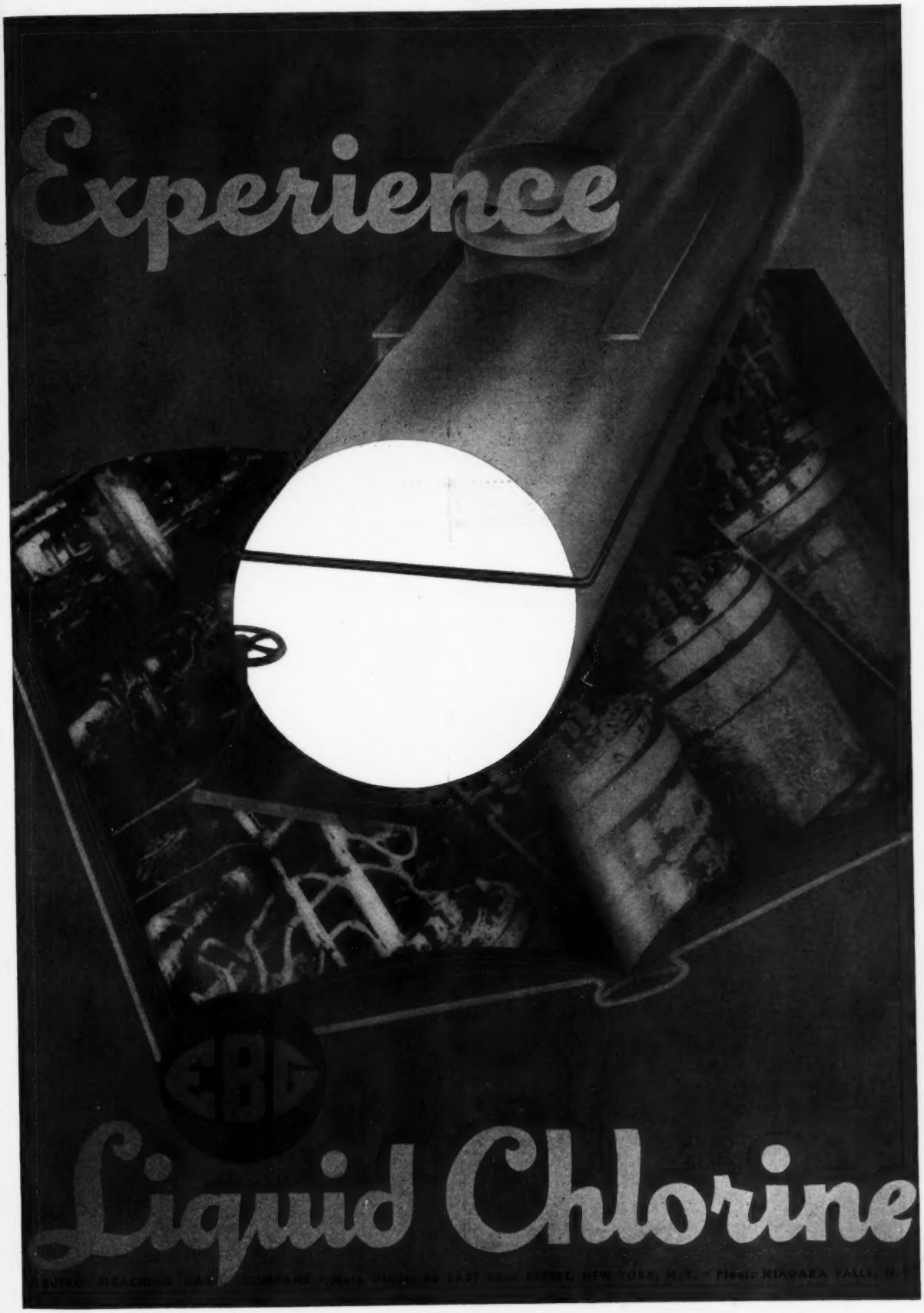
(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.00	@	—
Soft White.....	1.75	@	—
White Blk. News..	1.25	@	1.10
Book and Ledger—			
Flat Magazine and Book Stock (old)	.70	@	—
Light and Crumpled Book Stock.	.60	@	—
Ledgers and Writings	1.00	@	—
Manilas—			
New Manila Cut...	1.35	@	—
Printed Manilas...	.45	@	—
Kraft	.95	@	—
News and Scrap—			
Strictly Overissue..	.50	@	—
Strictly Folded....	.45	@	—
No. 1 Mixed Paper..	.30	@	—

Domestic Rags

(Price to Mills, f.o.b. Toronto)

No. 1 White Shirt Cuttings	.06½	@	.06¾
Light Prints.....	.03	@	.03¼


Experience
EBD
Liquid Chlorine